This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

+ *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.
+ *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.
+ *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.
+ *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at `http://books.google.com/`

L

Digitized by Google

BOSTON
MEDICAL LIBRARY

IN THE
Francis A. Countway
Library of Medicine
BOSTON

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

TRANSACTIONS OF THE AMERICAN GYNECOLOGICAL SOCIETY

VOLUME 46

FOR THE YEAR 1921

EDITED BY GEORGE GRAY WARD, JR., M.D.

NEW YORK
1921

Digitized by Google

MAY 2 1922
LIBRARY

Copyright, 1921
BY THE AMERICAN GYNECOLOGICAL SOCIETY

All Rights Reserved

MAY 2 1922
M. E. C.

Digitized by Google

CONTENTS

Officers viii
List of Officers from the Organization to the Present Time ix
Honorary Fellows xi
Deceased Honorary Fellows xiii
Active Fellows xv
Minutes of the Forty-sixth Annual Meeting xxxiii
Constitution xlvii
By-Laws xlviii

Address of the President: American Gynecology. By W. W. Chipman, M.D. 1
The Fads and Fancies of Obstetrics. A Comment on the Pseudo-scientific Trend of Modern Obstetrics. By Rudolph W. Holmes, M.D. 12
Forced Labor: Its Status in Obstetric Teaching. By John Osborn Polak, M.D. . . . 24
The Drudgery of Obstetrics and Its Effect Upon the Practice of the Art, with Some Suggestions for Relief. By Brooke M. Anspach, M.D. 32
Basal Metabolism in Pregnancy and the Puerperium. By Joseph L. Baer, M.D. . . 46
A Comparison by Statistical Methods of Certain External Pelvic Measurements of French and American Women. By Fred L. Adair, M.D. 55
Acute Malignant Endocarditis Complicating Pregnancy. By Palmer Findley, M.D. . 79
Vaginal Supracervical Hysterectomy with Interposition of the Cervical Stump for Cystocele and Procidentia Associated with Enlargement of the Uterus. By Hiram N. Vineberg, M.D. 81
The Interpretation of Vesical Symptoms in Gynecologic Diagnosis. By Floyd E. Keene, M.D. 92
Certain Dietary Factors in the Causation of Sterility in Rats. By Edward Reynolds, M.D., and Donald Macomber, M.D. 99
Pneumoperitoneum and Roentgenology as Aids to More Accurate Obstetric and Gynecologic Diagnosis. By Reuben Peterson, M.D. 116
Unsolved Problems in Gynecology and Obstetrics. By W. Blair Bell, M.D. 142
The Development of the Hymen. By Fred J. Taussig, M.D. 153
Perforating Hemorrhagic (Chocolate) Cysts of the Ovary. By John A. Sampson, M.D. . 162
Bacteriology and Pathology of Fallopian Tubes Removed at Operation. By Arthur H. Curtis, M.D. 242
Hemorrhage from the Non-pregnant Uterus in the Absence of a Neoplasm. By William A. Scott, M.B. 259
Ovulation and Menstruation as Postoperative Considerations. By Thomas J. Watkins, M.D. 271
Radical Conservatism in the Surgical Treatment of Chronic Adnexal Disease. By Frederick C. Holden, M.D. 276
The Disposition of the Uterus Following Salpingectomy Where it is Desirable to Preserve Menstruation. By Carey Culbertson, M.D. 280
Concerning Torsion of the Uterine Adnexa Occurring Before Puberty, Together with a Consideration of Torsion of Normal Adnexa. Report of a Case and Review of the Literature Since 1900. By Richard R. Smith, M.D., and William J. Butler, M.D. . . . 298

Digitized by Google

Torsion of the Cecum with Review of the Literature and Report of a Case. By SIDNEY A. CHALFANT, M.D. 315
Vulval and Vaginal Cancer Treated by Filtered and Unfiltered Radium Emanation. By HAROLD C. BAILEY, M.D., and HALSEY J. BAGG, PH.D. 319
The Cure of Cystic Cervical Endometritis by the Aid of Multiple Scarification. By HENRY T. BYFORD, M.D. 331
Endocervicitis and Eversion and the Nasal Cautery Tip. By ROBERT L. DICKINSON, M.D. 334
End Results of Amputation of the Cervix and Trachelorrhaphy. By REGINALD M. RAWLS, M.D. 340
Abdominal Abortion. By FRANKLIN S. NEWELL, M.D. 362

In Memoriam:
David Berry Hart, M.D., F.R.C.P., Edinburgh. By ROBERT L. DICKINSON, M.D. . 368
Benjamin Robinson Schenck, A.B., M.D., F.A.C.S. By W. P. MANTON, M.D. . . 372
Benjamin Franklin Baer, M.D. By GEORGE W. KOSMAK, M.D. 379
John Charles Reeve, M.D., LL.D. By LEROY BROUN, M.D. 380
Matthew Derbyshire Mann, A.B., A.M., M.D., F.A.C.S. By JAMES E. KING, M.D. . 386
Joseph Taber Johnson, A.M., Ph.D., M.D., LL.D., F.A.C.S. By J. WESLEY BOVEÉ, M.D. 390
Bache McEvers Emmet, M.D. By HENRY C. COE, M.D. 397

Digitized by Google

NOTE

The Society does not hold itself responsible for the views enunciated in the papers read at its meetings.

GEORGE GRAY WARD, Jr., M.D., *Editor*,
48 East Fifty-second Street, New York.

Digitized by Google

Digitized by Google

OFFICERS AND FELLOWS

OF THE

AMERICAN GYNECOLOGICAL SOCIETY

1921

Digitized by Google

OFFICERS FOR 1921*

PRESIDENT

WALTER W. CHIPMAN, MONTREAL

VICE-PRESIDENTS

HENRY PARKER NEWMAN, SAN DIEGO
HUGO EHRENFEST, ST. LOUIS

SECRETARY

GEORGE GRAY WARD, JR., NEW YORK

TREASURER

BROOKE M. ANSPACH, PHILADELPHIA

MEMBERS OF THE COUNCIL

FRANK FARROW SIMPSON, PITTSBURGH
[To serve one year]

JOHN G. CLARK, PHILADELPHIA
[To serve two years]

FRANKLIN H. MARTIN, CHICAGO
[To serve three years]

ROBERT L. DICKINSON, NEW YORK
[To serve four years]

OTHER MEMBERS OF THE COUNCIL

JOHN OSBORN POLAK, BROOKLYN
NOBLE SPROAT HEANEY, CHICAGO
[To serve one year]

* Officers for the ensuing year may be found in the minutes of the meeting, page xliv.

Digitized by Google

LIST OF OFFICERS

FROM THE ORGANIZATION TO THE PRESENT TIME

* Deceased.

	President.	Vice-Presidents.	Secretary.	Treasurer.
1876.	*Fordyce Barker	*Washington L. Atlee, *William H. Byford	*James R. Chadwick	*Paul F. Mundé
1877.	*Fordyce Barker	*Washington L. Atlee, *William H. Byford	*James R. Chadwick	*Paul F. Mundé
1878.	*Edmund R. Peaslee	*William Goodell, *Isaac E. Taylor	*James R. Chadwick	*Paul F. Mundé
1879.	*T. Gaillard Thomas	*D. Humphreys Storer, *Henry P. C. Wilson	*James R. Chadwick	*Paul F. Mundé
1880.	*J. Marion Sims	*W. T. Howard, *Robert Battey	*James R. Chadwick	*Paul F. Mundé
1881.	*W. H. Byford	*T. A. Reamy, *H. F. Campbell	*James R. Chadwick	*Paul F. Mundé
1882.	*Thomas Addis Emmet	*George H. Lyman, *Emil Noeggerath	*James R. Chadwick	*Paul F. Mundé
1883.	*Gilman Kimball	*Albert H. Smith, *Theophilus Parvin	*Frank P. Foster	*Paul F. Mundé
1884.	*Albert H. Smith	*James R. Chadwick, *Samuel C. Busey	*Frank P. Foster	*Matthew D. Mann
1885.	*William T. Howard	Wm. L. Richardson, *Paul F. Mundé	*Frank P. Foster	*Matthew D. Mann
1886.	*Thaddeus A. Reamy	*Theophilus Parvin *Geo. J. Engelmann	*Joseph Taber Johnson	*Matthew D. Mann
1887.	*Alex. J. C. Skene	*John C. Reeve, *Ellwood Wilson	*Joseph Taber Johnson	*Matthew D. Mann
1888.	*Robert Battey	*A. Reeves Jackson, *James R. Chadwick	*Joseph Taber Johnson	*Matthew D. Mann
1889.	*Henry P. C. Wilson	*William T. Lusk, *Edward W. Jenks	*Joseph Taber Johnson	*Matthew D. Mann
1890.	*John P. Reynolds	*William M. Polk, *Ely Van de Warker	*Joseph Taber Johnson	*Matthew D. Mann
1891.	*A. Reeves Jackson	*Joseph Taber Johnson, *William H. Baker	Henry Clark Coe	*Matthew D. Mann
1892.	*John Byrne	*Richard B. Maury, *Cornelius Kollock	Henry Clark Coe	*Matthew D. Mann
1893.	*Theophilus Parvin	*William H. Parish, *William H. Baker	Henry Clark Coe	*Matthew D. Mann
1894.	*William T. Lusk	*Samuel C. Busey, *Bache McE. Emmet	Henry Clark Coe	*Matthew D. Mann
1895.	*Matthew D. Mann	*Geo. J. Engelmann, Clement Cleveland	Henry Clark Coe	J. Montgomery Baldy
1896.	*William M. Polk	*James H. Etheridge, *Fernand Henrotin	Henry Clark Coe	J. Montgomery Baldy
1897.	*James R. Chadwick	*R. Stansbury Sutton, *Henry J. Garrigues	J. Riddle Goffe	J. Montgomery Baldy
1898.	*Paul F. Mundé	Emilius C. Dudley, *Arthur W. Johnstone	J. Riddle Goffe	J. Montgomery Baldy
1899.	*Joseph Taber Johnson	Howard A. Kelly, *A. F. A. King	J. Riddle Goffe	J. Montgomery Baldy
1900.	*George J. Engelmann	*Edward L. Duer, Seth C. Gordon	J. Riddle Goffe	J. Montgomery Baldy
1901.	*Ely Van de Warker	*Charles Jewett, *Richard B. Maury	J. Riddle Goffe	J. Montgomery Baldy
1902.	Seth C. Gordon	*George M. Edebohls, Edward Reynolds	J. Riddle Goffe	J. Montgomery Baldy
1903.	*Joseph E. Janvrin	*Edward W. Jenks, *A. Palmer Dudley	J. Riddle Goffe	J. Montgomery Baldy
1904.	Edward Reynolds	J. Whitridge Williams, Edward P. Davis	J. Riddle Goffe	J. Montgomery Baldy
1905.	E. C. Dudley	*Henry D. Fry, Henry C. Coe	J. Riddle Goffe	J. Montgomery Baldy
1906.	*Richard B. Maury	Howard A. Kelly, Reuben Peterson	J. Riddle Goffe	J. Montgomery Baldy
1907.	Clement Cleveland	Willis E. Ford, J. Clifton Edgar	J. Riddle Goffe	J. Montgomery Baldy
1908.	J. Montgomery Baldy	I. S. Stone, Eugene Boise	J. Riddle Goffe	Charles P. Noble
1909.	J. Riddle Goffe	Howard A. Kelly, Malcolm McLean	Le Roy Broun	J. Wesley Bovée

Digitized by Google

	President.	Vice-Presidents.	Secretary.	Treasurer.
1910.	Edward P. Davis	Seth C. Gordon, Edward Reynolds	Le Roy Broun	J. Wesley Bovée
1911.	Reuben Peterson	John F. Thompson, John G. Clark	Le Roy Broun	J. Wesley Bovée
1912.	Howard A. Kelly	Richard R. Smith, John A. Sampson	Le Roy Broun	J. Wesley Bovée
1913.	Henry C. Coe	George H. Noble, George Gellhorn	Le Roy Broun	J. Wesley Bovée
1914.	J. Whitridge Williams	Thomas J. Watkins, Howard C. Taylor	Le Roy Broun	J. Wesley Bovée
1915.	Thomas J. Watkins	Frank Farrow Simpson, Howard C. Taylor	Le Roy Broun	J. Wesley Bovée
1916.	J. Wesley Bovée	Robert L. Dickinson, George Gellhorn	Le Roy Broun	Brooke M. Anspach
1917.	Frank Farrow Simpson	Le Roy Broun, W. Francis B. Wakefield	George Gray Ward, Jr.	Brooke M. Anspach
1918.	John G. Clark	Henry T. Byford, *Brooks H. Wells	George Gray Ward, Jr.	Brooke M. Anspach
1919.	Franklin H. Martin	Edward E. Montgomery Wm. E. Studdiford	George Gray Ward, Jr.	Brooke M. Anspach
1920.	Robert L. Dickinson	J. Clarence Webster, J. C. Litzenberg	George Gray Ward, Jr.	Brooke M. Anspach
1921.	Walter W. Chipman	Henry P. Newman Hugo Ehrenfest	George Gray Ward, Jr.	Brooke M. Anspach

Digitized by Google

HONORARY FELLOWS

American

Elected

1920. WILLIAM E. ASHTON, M.D., 2011 Walnut St., Philadelphia, Pa.
1919. J. MONTGOMERY BALDY, M.D., Devon, Chester County, Pa.
1917. HERMANN J. BOLDT, M.D., 616 Madison Ave., New York.
1912. B. BERNARD BROWNE, M.D., 510 Park Ave., Baltimore, M.D.
1918. CLEMENT CLEVELAND, M.D., 925 Park Ave., New York.
1915. HENRY C. COE, M.D., 616 Madison Ave., New York.
1914. ANDREW F. CURRIER, M.D., 173 East Lincoln Ave., Mt. Vernon, N. Y.
1914. FRANCIS H. DAVENPORT, M.D., 390 Commonwealth Ave., Boston, Mass.
1917. EMILIUS CLARK DUDLEY, M.D., 122 South Michigan Ave., Chicago, Ill.
1915. WILLIS E. FORD, M.D., Utica, New York.
1905. WILLIAM GARDNER, M.D., 457 Sherbrooke St., W., Montreal, Can.
1914. EUGENE C. GEHRUNG, M.D., 4177 King St., Denver, Col.
1921. J. RIDDLE GOFFE, M.D., 114 East 54th St., New York.
1915. SETH CHASE GORDON, M.D., Portland, Maine.
1920. CHARLES M. GREEN, M.D., 78 Marlborough St., Boston, Mass.
1920. GEORGE TUCKER HARRISON, M.D., University of Virginia, Va.
1916. PHINEAS H. INGALLS, M.D., 49 Pearl St., Hartford, Conn.
1921. CYRUS A. KIRKLEY, M.D., 432 South Serrano Ave., Los Angeles, Calif.
1921. FLORIAN KRUG, M.D., 616 Madison Ave., New York.
1921. MALCOLM McLEAN, M.D., 40 East 41st St., New York.
1917. CHARLES P. NOBLE, M.D., 1832 Spruce St., Philadelphia, Pa.
1917. EDWARD REYNOLDS, M.D., 321 Dartmouth St., Boston, Mass.
1921. HUNTER ROBB, M.D., Winchester, Mass.
1903. WILLIAM L. RICHARDSON, M.D., 225 Commonwealth Ave., Boston, Mass. *Founder.*
1918. W. GILL WYLIE, M.D., 28 West 40th St., New York.

Foreign

1921. A. H. FREELAND-BARBOUR, M.D., 7 Charlotte Square, Edinburgh, Scotland.
1878. J. AMÉDÉE DOLÉRIS, M.D., 7 Rue de Logelbach, Paris, France.
1909. ALBAN HENRY GRIFFITHS DORAN, F.R.C.S. (England), 6 Palace Mansions, Addison Bridge, Kensington, Lond.
1920. THOMAS WATTS EDEN, M.D., 26 Queen Anne's St., London, Eng.
1909. MAX HOFMEIER, M.D., Schoenleinster 4, Würzburg, Germany.
1895. CHARLES JACOBS, M.D., 53 Boulevard de Waterloo, Brussels, Belgium.
1912. J. M. MUNRO KERR, M.D., 7 Clairmont Gardens, Glasgow, Scotland.
1888. AUGUST MARTIN, M.D., Berlin-Schöneberg Freiheer vom Steinstr., Germany.
1912. W. NAGEL, M.D., Potsdamerstr. 121h, Berlin W. 35, Germany.
1909. HERBERT R. SPENCER, M.D., 104 Harley St., W. London, Eng.
1901. TH. TUFFIER, M.D., 42 Avenue Gabriel, Paris, France.

Total, thirty-six Honorary Fellows.

Digitized by Google

Digitized by Google

HONORARY FELLOWS

DECEASED

Elected		Died
1888.	THOMAS A. ASHBY, M.D., Baltimore, Maryland.	1916
1877.	JOHN L. ATLEE, M.D., Lancaster, Pa.	1885
1914.	BENJAMIN F. BAER, M.D., Philadelphia, Pa.	1920
1884.	GEORGE GRANVILLE BANTOCK, M.D., London, England.	1913
1910.	WILLIAM H. BAKER, M.D., Boston, Massachusetts.	1915
1876.	ROBERT BARNES, M.D., London, England.	1907
1892.	ROBERT BATTEY, M.D., Rome, Georgia. *Founder.*	1895
1878.	JOHN S. BILLINGS, M.D., LL.D., New York City.	1913
1897.	SAMUEL C. BUSEY, M.D., LL.D., Washington. *Founder.*	1901
1910.	J. CHALMERS CAMERON, M.D., Montreal, Canada.	1912
1890.	HENRY F. CAMPBELL, M.D., Augusta, Georgia. *Founder.*	1891
1904.	JAMES R. CHADWICK, A.M., M.D., Boston, Massachusetts. *Founder.*	1905
1889.	M. CHARPENTIER, M.D., Paris, France.	
1893.	CHARLES J. CULLINGWORTH, M.D., London, England.	1908
1877.	JOHN C. DALTON, M.D., New York City.	1889
1877.	J. A. H. DEPAUL, M.D., Paris, France.	
1879.	EDWARD L. DUER, M.D., Bryn Mawr, Pa.	1917
1878.	J. MATTHEWS DUNCAN, M.D., London, England.	1890
1888.	ALEXANDER DUNLAP, M.D., Springfield, Ohio.	1894
1912.	BACHE McE. EMMET, M.D., New York.	1921
1876.	THOMAS ADDIS EMMET, M.D., New York. *Founder.*	1919
1876.	JOSEPH A. EVE, M.D., Augusta, Georgia.	1886
1890.	HENRY D. FRY, M.D., Washington, D. C.	1918
1901.	HENRY J. GARRIGUES, M.D., Tryon, North Carolina.	1913
1889.	ROBERT P. HARRIS, M.D., Philadelphia, Pa.	1899
1899.	D. BERRY HART, M.D., Edinburgh, Scotland.	1920
1888.	GRAILY HEWITT, M.D., London, England.	1893
1881.	J. BRAXTON HICKS, M.D., London, England.	1897
1902.	WILLIAM T. HOWARD, M.D., Baltimore, Md. *Founder.*	1907
1911.	JOSEPH E. JANVRIN, M.D., New York City.	1911
1915.	JOSEPH TABER JOHNSON, M.D., Cherrydale, Virginia. *Founder.*	1921
1876.	THOMAS KEITH, M.D., London, England.	1895
1888.	GILMAN KIMBALL, M.D., Lowell, Massachusetts.	1892
1891.	CHRISTIAN G. LEOPOLD, M.D., Dresden, Germany.	1912
1902.	MATTHEW D. MANN, M.D., Buffalo, New York.	1921
1883.	RICHARD B. MAURY, M.D., Memphis, Tennessee.	1918
1876.	ALFRED H. M'CLINTOCK, M.D., Dublin, Ireland.	1881
1892.	OTTAVIO MORISANI, M.D., Naples, Italy.	
1888.	EMIL NOEGGERATH, M.D., Wiesbaden, Germany. *Founder.*	1895
1891.	ROBERT OLSHAUSEN, Berlin, Germany.	1916
1877.	CHARLES PAJOT, M.D., Paris, France.	1899
1880.	CHAUNCEY D. PALMER, M.D., Cincinnati, Ohio.	1917
1901.	KARL PAWLIK, M.D., Prague, Bohemia.	1914

Digitized by Google

Elected		Died
1908.	J. PFANNENSTIEL, M.D., Kiel, Germany.	1909
1885.	W. S. PLAYFAIR, M.D., London, England.	1903
1891.	S. POZZI, M.D., Paris, France.	1918
1888.	Sir WILLIAM O. PRIESTLEY, M.D., LL.D., London, England.	1900
1907.	THADDEUS A. REAMY, M.D., Cincinnati, Ohio.	1909
1897.	JOHN C. REEVE, M.D., Dayton, Ohio. *Founder.*	1920
1901.	M. SAENGER, M.D., Prague, Bohemia.	1903
1877.	F. W. VON SCANZONI, M.D., Würzburg, Bavaria.	
1896.	PAUL SEGOND, M.D., Paris, France.	
1876.	CARL SCHROEDER, M.D., Berlin, Germany.	1897
1876.	GUSTAV SIMON, M.D., Heidelberg, Germany.	1876
1888.	Sir ALEXANDER R. SIMPSON, Kt., M.D., Edinburgh, Scotland.	1916
1888.	D. HUMPHREYS STORER, M.D., Boston, Massachusetts. *Founder.*	1891
1905.	R. STANSBURY SUTTON, M.D., Pittsburgh, Pa.	1906
1882.	LAWSON TAIT, Esq., Birmingham, England.	1899
1881.	S. TARNIER, M.D., Paris, France.	1897
1888.	ISAAC E. TAYLOR, M.D., New York City. *Founder.*	1889
1893.	T. GAILLARD THOMAS, M.D., New York City. *Founder.*	1903
1882.	J. KNOWSLEY THORNTON, M.B., C.M., London, England.	1904
1909.	ELY Van de WARKER, M.D., Syracuse, N. Y.	1910
1886.	Sir SPENCER WELLS, Bart., M.D., London, England.	1897
1881.	FRANZ von WINCKEL, M.D., Munich, Germany.	1912
1876.	MARMADUKE B. WRIGHT, M.D., Cincinnati.	1879

Digitized by Google

ACTIVE FELLOWS

1915.—ADAIR, FRED L., M.A., M.D., F.A.C.S. Associate Professor of Obstetrics and Gynecology, University of Minnesota; Chief of Division of Obstetrics and Gynecology, Minneapolis General Hospital; Obstetrician and Gynecologist to St. Andrew's Hospital; Obstetrician and Chief of Staff of Swedish Hospital; Obstetrician to Fairview Hospital; Obstetrician to Norwegian Lutheran Deaconess Hospital. 730 La Salle Building, Minneapolis, Minn.

1906.—ANDREWS, FRANK T., A.M., M.D., F.A.C.S. Professor of Clinical Gynecology, Northwestern University Medical School; Gynecologist to Mercy and Wesley Hospitals and South Side Dispensary. 448 Barry Avenue, Chicago, Ill.

1909.—ANSPACH, BROOKE M., M.D., F.A.C.S. Professor of Gynecology, Jefferson Medical College. Gynecologist and Obstetrician to the Philadelphia and Stetson Hospitals; Attending Gynecologist to Bryn Mawr Hospital. *Treasurer.* 1827 Spruce Street, Philadelphia, Penn.

1916.—BAILEY, HAROLD CAPRON, M.D., F.A.C.S. Associate Professor in Obstetrics, Cornell University Medical College; Assistant Obstetrician to Bellevue Hospital; Assistant Obstetrician to Manhattan Maternity Hospital; Associate Gynecologist, Memorial Hospital. 22 East Sixty-eighth Street, New York.

1917.—BARRETT, CHANNING WHITNEY, M.D., F.A.C.S. Professor of Gynecology and Clinical Gynecology and Head of the Division, University of Illinois Medical School; Professor of Gynecology, Chicago Polyclinic School; Attending Gynecologist and Head of the Department, Cook County Hospital; Attending Gynecologist Polyclinic, Henrotin, Memorial and West Side Hospitals. 4245 North Ashland Avenue, Chicago, Ill.

1908.—BISSELL, DOUGAL, M.D., F.A.C.S. Surgeon to the Woman's Hospital in the State of New York; Consulting Surgeon to the State Hospital (Insane), Central Islip, L. I. 219 West Seventy-ninth Street, New York.

1897.—BOVÉE, J. WESLEY, M.D., F.A.C.S. Professor of Gynecology, George Washington University; Gynecologist to Columbia and George Washington University Hospitals, and St. Elizabeth's Hospital for the Insane. *President,* 1916. *Treasurer,* 1909–1915. *Council,* 1917–1921. The Rochambeau, 815 Connecticut Avenue, Washington, D. C.

1909.—BRETTAUER, JOSEPH, M.D., F.A.C.S. Gynecologist to Mt. Sinai Hospital, New York; Consulting Gynecologist to New Jersey State Hospital, Greystone Park, N. J., and to the United Hospital, Portchester, N. Y. *Council,* 1916. 1063 Madison Avenue, New York.

1905.—BROUN, LE ROY, B.S., M.D., F.A.C.S. Surgeon to Woman's Hospital in the State of New York; Consulting Surgeon to Manhattan State Hospital and Baptist Home. *Secretary,* 1909–1916. *Vice-president,* 1917. 148 West Seventy-seventh Street, New York.

1919.—BURNAM, CURTIS F., B.A., M.D., F.A.C.S. Howard A. Kelly Hospital, Baltimore. 1418 Eutaw Place, Baltimore, Md.

Digitized by Google

1898.—BURRAGE, WALTER L., A.M., M.D. Formerly Gynecologist to St. Elizabeth's and the Carney Hospitals; Physician to Out-Patients, Free Hospital for Women, Boston. 42 Eliot Street, Jamaica Plain, Boston, Mass.

1889.—BYFORD, HENRY T., M.D., F.A.C.S. Emeritus Professor of Gynecology, University of Illinois; Consulting Gynecologist, St. Luke's Hospital. *Vice-President*, 1918; Peoples Gas Building, Cor. Michigan Avenue and Adams Street, Chicago, Ill.

1921.—CARROLL, THOMAS B., M.D., F.A.C.S. Obstetrician to Columbia Hospital; Obstetrician to St. Francis Hospital, Pittsburgh. Jenkins Arcade, Pittsburgh, Penn.

1921.—CASLER, DE WITT B., M.D., F.A.C.S. Consulting Gynecologist, Hospital for Women of Maryland; Union Protestant Infirmary, Church Home and Infirmary, Baltimore. 13 West Chase Street, Baltimore, Md.

1915.—CHALFANT, SIDNEY A., B.S., M.D., F.A.C.S. Assistant Professor of Gynecology, Medical Department, University of Pittsburgh; Gynecologist, Allegheny General Hospital and Magee Hospital, Pittsburgh; Columbia Hospital, Wilkinsburg, Penn. 7048 Jenkins Arcade Building, Pittsburgh, Penn.

1913.—CHILD, CHARLES GARDNER, JR., M.D. Professor of Obstetrics and Gynecology in the New York Polyclinic Medical School; Attending Gynecologist and Obstettrician to the New York Polyclinic Hospital; Attending Gynecologist to City Hospital; Consulting Gynecologist, Nassau Hospital; Consulting Gynecologist, St. Bartholomew's Hospital. 163 East Seventy-first Street, New York.

1903.—CHIPMAN, WALTER WILLIAM, M.D., F.A.C.S., F.R.C.S. (Edin.). Professor of Obstetrics and Gynecology, McGill University; Gynecologist to the Royal Victoria Hospital; Obstetric Physician to the Montreal Maternity Hospital. *Council*, 1912. *President*, 1921. 285 Mountain Street, Montreal, Canada.

1903.—CLARK, JOHN G., M.D., F.A.C.S. Professor of Gynecology, University of Pennsylvania; Gynecologist-in-Chief, University Hospital; Consulting Gynecologist to the Jewish, Bryn Mawr, Germantown, Chestnut Hill and other hospitals; Chairman, Section Obstetrics, Gynecology and Abdominal Surgery, American Medical Association, 1910. *Vice-President*, 1911. *President*, 1918. *Council*. 2017 Walnut Street, Philadelphia, Penn.

1916.—CLARK, SAMUEL M.D., B.Sc., M.D., F.A.C.S. Professor of Gynecology and Clinical Obstetrics, Tulane University: In charge of Department of Gynecology, Tulane University; Chief of Gynecological Division, Charity Hospital, New Orleans. 108 Baronne Street, New Orleans, La.

1909.—CROSSEN, HARRY STURGEON, M.D., F.A.C.S. Clinical Professor of Gynecology, Washington University Medical School, and Gynecologist-in-Chief to the Barnes Hospital; Gynecologist to St. Luke's Hospital and St. Louis Maternity Hospital; Consulting Gynecologist to St. John's, Jewish and City Hospitals. Metropolitan Building, St. Louis, Mo.

1921.—CULBERTSON, CAREY, M.D., F.A.C.S. Assistant Professor of Obstetrics and Gynecology, Rush Medical College, Chicago; Attending Gynecologist, Cook County Hospital, Chicago; Attending Gynecologist and Obstetrician, Presbyterian Hospital, Chicago. 30 North Michigan Avenue, Chicago, Ill.

1904.—CULLEN, THOMAS S., M.B., F.A.C.S. Professor of Clinical Gynecology, Johns Hopkins University; Visiting Gynecologist, Johns Hopkins Hospital; Consulting Gynecologist, Church Home and Infirmary. *Council*, 1914. 20 E. Eager Street, Baltimore, Md.

1914.—CURTIS, ARTHUR H., B.S., M.D., F.A.C.S. Senior Gynecologist, St. Luke's Hospital; Clinical Professor of Gynecology, Northwestern University Medical School. *Council*, 1917. 104 South Michigan Avenue, Chicago, Ill.

Digitized by Google

1920.—Danforth, William C., M.D., B.S., F.A.C.S. Senior Gynecologist and Obstetrician, Evanston Hospital; Associate Professor of Gynecology, Northwestern University. 1620 Hinman Avenue, Evanston, Ill.

1920.—Davis, Carl Henry, A.B., M.D., F.A.C.S. Attending Obstetrician, Columbia Hospital; Attending Obstetrician and Gynecologist, Milwaukee County Hospital; Lecturer in Obstetrics and Gynecology, Post-Graduate Medical Instruction, Extension Division, University of Wisconsin. 141 Wisconsin Street, Milwaukee, Wis.

1891.—Davis, Edward P., A.M., M.D., F.A.C.S. Professor of Obstetrics, Jefferson Medical College; Obstetrician to the Jefferson Hospital; Obstetrician and Gynecologist to Philadelphia Hospital; Consultant to the Preston Retreat; Member (Founder) International Congress of Obstetrics and Gynecology; Honorary Member of Chicago Gynecological Society; Academy of Surgery, Bucharest; Honorary Member of the Ophthalmological Society of Egypt; Medical Society of Virginia; Member of College of Physicians of Philadelphia; Philadelphia Obstetrical Society. *Council,* 1896–1899. *Vice-President,* 1904. *President,* 1910. *Council,* 1911–1914. 250 South Twenty-first Street, Philadelphia, Penn.

1918.—De Lee, Joseph Bolivar, A.M., M.D., F.A.C.S. Professor of Obstetrics, Northwestern University Medical School; Obstetrician to the Chicago Lying-in Hospital and Dispensary; Consulting Obstetrician to Provident and Evanston Hospitals. 5028 Ellis Avenue, Chicago, Ill.

1892.—Dickinson, Robert L., M.D., F.A.C.S. Senior Gynecologist and Obstetrician, Brooklyn Hospital; Clinical Professor of Gynecology, Long Island College Hospital; Consulting Obstetrician, Methodist-Episcopal Hospital. *Vice-President,* 1916. *President,* 1920. *Council,* 1921. 13 East 65th Street, New York.

1893.—Edgar, James Clifton, Ph.B., A.M., M.D., F.A.C.S. Formerly Professor of Obstetrics and Clinical Midwifery, Cornell University Medical College of New York; Attending Surgeon to the Manhattan Maternity Hospital; Attending Obstetrician to Bellevue Hospital; Consulting Obstetrician to the New York Maternity, the Jewish Maternity, and the Greenwich (Conn.) Hospitals. *Vice-President,* 1907. 28 West Fifty-sixth Street, New York.

1907.—Ehrenfest, Hugo, M.D. Physician-in-Chief, St. Louis Obstetric Dispensary; Gynecologist, Jewish Hospital. *Council,* 1921. 4333 McPherson Avenue, St. Louis, Mo.

1921.—Farrar, Lilian K. P., A.B., M.D., F.A.C.S. Assistant Professor of Obstetrics and Gynecology, Cornell University Medical College, New York; Junior Attending Surgeon, Woman's Hospital in the State of New York; Consulting Gynecologist, Booth Memorial Hospital, New York. 611 West One Hundred and Tenth Street, New York.

1904.—Findley, Palmer, B.S., M.D., F.A.C.S. *Council,* 1913. 670 Brandeis Theatre Building, Omaha, Neb.

1913.—Foulkrod, Collin, A.B., M.D., F.A.C.S. Obstetrician to the Presbyterian Hospital in Philadelphia. 3910 Chestnut Street, Philadelphia, Penn.

1912.—Frank, Robert Tilden, B.A., M.A., M.D., F.A.C.S. Formerly Associate Gynecologist, Mount Sinai Hospital, New York. 511 Majestic Building, Denver, Col.

1904.—Gellhorn, George, M.D., F.A.C.S. Associate in Clinical Gynecology, Washington University; Gynecologist to St. Luke's Hospital and Barnard Free Skin and Cancer Hospital; Visiting Gynecologist to St. Louis City Hospital; Assistant Gynecologist to Barnes Hospital; Consulting Obstetrician to St. Louis Maternity Hospital;

Digitized by Google

Consulting Gynecologist to St. John's Hospital; Fellow of Deutsche Gesellschaft für Gynäkologie; Non-resident Member of Gynecological Society of Berlin; Honorary Member of Chicago Gynecological Society. *Vice-President,* 1913 and 1916. 713 Metropolitan Building, St. Louis, Mo.

1911.—GOODALL, JAMES R., B.A., M.D., C.M., D.Sc. Lecturer on Obstetrics, McGill University; Assistant Obstetric Physician to the Montreal Maternity Hospital; Consulting Gynecologist to the General Hospital, Saranac, N.Y., and Alice Hyde Hospital, Malone, N. Y.; Consulting Gynecologist to the Herzl Institute, Montreal. 377 Mountain Street, Montreal, Canada.

1913.—GRAVES, WILLIAM P., A.B., M.D., F.A.C.S. Surgeon-in-Chief to the Free Hospital for Women, Brookline; Professor of Gynecology, Harvard Medical School; Consulting Gynecologist, Boston Lying-in Hospital. *Council,* 1919. 244 Marlborough Street, Boston, Mass.

1895.—HARRIS, PHILANDER A., M.D., F.A.C.S. Gynecologist and Obstetrician to the Paterson General Hospital; Consulting Gynecologist to the Passaic General Hospital, Passaic, N. J.; the Miriam Barnert Hospital, Paterson, N. J.; the Alexander Lynn Hospital, Sussex, N. J., and to the New Jersey State Hospital; Corresponding Member of the Obstetrical and Gynecological Society of Paris, France (1895); Ex-First Vice-President of the American Medical Association (1913); Ex-President of the Society of Surgeons of New Jersey; Ex-President of the New Jersey Medical Society. 26 Church Street, Paterson, N. J.

1913.—HEANEY, NOBLE SPROAT, A.B., M.D., F.A.C.S. Associate Professor of Obstetrics and Gynecology and Acting Head of the Department in Rush Medical College; Attending Obstetrician and Gynecologist to the Presbyterian Hospital. *Council,* 1921. 104 South Michigan Avenue, Chicago, Ill.

1891.—HIRST, BARTON COOKE, A.B., M.D., LL.D., F.A.C.S. Professor of Obstetrics, University of Pennsylvania; Consulting Surgeon, Newport and Pottstown Hospitals; Gynecologist to the Howard and Orthopædic Hospitals; Consulting Obstetrician to the Lying-in Charity, Preston Retreat. 1821 Spruce Street, Philadelphia, Penn.

1916.—HOLDEN, FREDERICK CLARK, M.D., F.A.C.S. Professor of Gynecology, New York University and Bellevue Medical College; Gynecologist to Bellevue Hospital. 13 East Sixty-fifth Street, New York.

1918.—HOLMES, RUDOLPH WIESER, M.D., F.A.C.S. Associate Professor of Obstetrics and Gynecology, Rush Medical College; Attending Obstetrician, Augustana and Passavant Memorial Hospitals. 30 North Michigan Avenue, Chicago, Ill.

1913.—HUGGINS, RALEIGH R., M.D., F.A.C.S. Professor of Gynecology, University of Pittsburgh; Gynecologist to St. Francis Hospital; Director of The Elizabeth Steel Magee Hospital for Women. 1018 Westinghouse Building, Pittsburgh, Penn.

1916.—HUNNER, GUY LE ROY, B.Sc., M.D., D.Sc., F.A.C.S. Lecturer in Clinical Gynecology, Johns Hopkins University. 2305 St. Paul Street, Baltimore, Md.

1916.—HUTCHINS, HENRY TALBOT, A.B., M.D., F.A.C.S. Surgeon, Massachusetts Women's Hospital, Boston. Gynecologist, The Children's Hospital, Boston; Consulting Gynecologist, Frost Hospital, Chelsea, and Memorial Hospital, Pawtucket, R. I. 520 Commonwealth Avenue, Boston, Mass., Residence, 130 Dudley Road, Newton Center, Mass.

1920.—KEENE, FLOYD E., M.D., F.A.C.S. Associate in Gynecology, University of Pennsylvania; Assistant Gynecologist, University of Pennsylvania Hospital; Gynecologist, Chestnut Hill Hospital; Consulting Gynecologist, Abington Memorial Hospital, Philadelphia. Medical Arts Building, Philadelphia, Penn.

Digitized by Google

1887.—Kelly, Howard Atwood, B.A., M.D., LL.D., F.A.C.S., F.R.C.S. (Edinburgh). Professor Emeritus of Gynecology, Johns Hopkins University; Honorary Consulting Gynecologist to the Johns Hopkins Hospital; Honorary Member, Royal Medical Society of Edinburgh; Honorary Member, Italian Society of Obstetrics and Gynecology, Rome; Honorary Member, Society of Gynecology and Obstetrics, Berlin; Member of Society of Obstetrics, Leipzig; Honorary Fellow, Edinburgh Obstetrical Society; Honorary Fellow, Royal Academy of Medicine, Ireland; Honorary Fellow, Glasgow Obstetrical and Gynecological Society; Corresponding Member, Society of Obstetrics and Gynecology, Paris; Corresponding Member, Society of Surgery, Paris; Corresponding Member, Royal Society of Physicians, Vienna; Fellow, British Gynecological Society; Member, French Urological Association, Paris; Honorary Member, Society of Gynecology and Obstetrics, Belgium; Honorary Member, Peruvian Surgical Society, 1920. Honorary Fellow, Royal College of Surgeons, Edinburgh; Honorary Fellow, Chicago Gynecological Society; Associate Foreign Member, Society of Obstetrics, Gynecology and Pediatrics and Chirurgical Society, Paris; Corresponding Member, Academy of Roumania (1921); Commander of the Order of Leopold (Conferred by King Albert of Belgium, 1920). *Vice-President*, 1899 and 1906. *President*, 1912. *Council*, 1913–1915. 1418 Eutaw Place, Baltimore, Md.

1917.—King, James E., M.D., F.A.C.S. Professor of Clinical Gynecology, University of Buffalo; Attending Gynecologist, Buffalo General; Gynecologist-in-Chief, Buffalo City Hospital. Member Royal Society Medicine, London. 1248 Main Street, Buffalo, New York.

1918.—Kosmak, George W., A.B., M.D., F.A.C.S. Attending Surgeon to the Lying-in Hospital, New York. Editor of American Journal of Obstetrics and Gynecology. 23 East Ninety-third Street, New York.

1913.—Little, Herbert M., M.D., F.A.C.S. Assistant Professor of Obstetrics and Lecturer on Gynecology, McGill University; Assistant Accoucheur, Montreal Maternity Hospital; Assistant Gynecologist, Montreal General Hospital. 285 Stanley Street, Montreal, Canada.

1916.—Litzenberg, Jennings Crawford, B.Sc., M.D., F.A.C.S. Professor of Obstetrics and Gynecology, University of Minnesota; Chief of Department of Obstetrics and Gynecology; Chief of Staff, Out-Patient Department; Obstetrician and Gynecologist in Chief, University of Minnesota Hospital; Attending Obstetrician in Northwestern and St. Mary's Hospitals. *Vice-President*, 1920. The Nicollet Clinic, 1009 Nicollet Avenue, Minneapolis, Minn.

1916.—Lynch, Frank Worthington, A.B., M.D., F.A.C.S. Professor of Obstetrics and Gynecology, University of California; Director of Woman's Clinic, University Hospital. 2511 Broadway, San Francisco, Calif.

1913.—McGlinn, John A., M.D., M.S. Associate Professor of Gynecology in the Post-Graduate School of the University of Pennsylvania; Gynecologist to St. Agnes' Hospital; Gynecologist and Obstetrician to Philadelphia General Hospital; Gynecologist to Medico-Chirurgical Hospital; Gynecologist to Polyclinic Hospital; Obstetrician to St. Vincent's Maternity Hospital; Consulting Gynecologist to St. Francis' Convalescent Home; Consulting Gynecologist to Phipps Institute; Eagleville Sanitarium; Bureau of Public Welfare, Philadelphia. 113 South Twentieth Street, Philadelphia, Penn.

1916.—McMurtry, Lewis Samuel, M.D., LL.D., F.A.C.S. Professor of Abdominal Surgery and Gynecology, University of Louisville; Surgeon to Louisville City Hospital; Surgeon to John N. Norton Memorial Infirmary; Fellow of the Edinburgh Obstetrical Society, etc. Francis Building, Louisville, Ky.

Digitized by Google

1901.—MANTON, WALTER PORTER, M.D., F.A.C.S. Director and Professor, Department of Obstetrics, Detroit College of Medicine and Surgery; Gynecologist Emeritus to Harper Hospital, Gynecologist to the Eastern and Northern Michigan State Hospitals Consulting Gynecologist to St. Joseph's Retreat; Consulting Director, Maternity Department, Herman Kiefe Hospital (Municipal); Formerly Visiting Obstetrician and President of the Medical Board, Woman's Hospital and Infant's Home; President, Wayne County Medical Society, 1908–1909; Chairman, Section on Obstetrics and Diseases of Women, American Medical Association, 1908–1909; Fellow of the Royal Society of Medicine. 32 Adams Avenue, Detroit, Michigan.

1908.—MARTIN, FRANKLIN H., M.D., F.A.C.S. Professor of Gynecology, Post-Graduate Medical School of Chicago; Secretary-General, American College of Surgeons and Clinical Congress of the American College of Surgeons; Editor, Surgery, Gynecology and Obstetrics; Member of the Advisory Commission and Chairman of the General Medical Board of the Council of National Defense. *President*, 1919. *Council*, 1920. 30 North Michigan Avenue, Chicago, Ill.

1916.—MILLER C. JEFF, M.D., F.A.C.S. Professor of Obstetrics and Clinical Gynecology, Tulane University Medical School; Chief of Division of Obstetrics and Gynecology, Charity Hospital; Chief of Department of Gynecology, Touro Infirmary; *Council*, 1919. 124 Baronne Street, New Orleans, La.

1909.—MILLER, GIDEON BROWN, B.Sc., M.D., F.A.C.S. Attending Gynecologist to the Emergency Hospital, the Garfield Hospital, and to the Columbia Hospital; Clinical Professor of Gynecology in the George Washington University. *Council*, 1920. 1730 K. Street, N. W., Washington, D. C.

1894.—MONTGOMERY, EDWARD E., A.M., M.D., LL.D., F.A.C.S. Emeritus Professor of Gynecology, Jefferson Medical College; Gynecologist to Jefferson Medical College and to St. Joseph's Hospitals. *Vice-President*, 1919. 1426 Spruce Street, Philadelphia, Penn.

1912.—MORLEY, WILLIAM HORACE, Ph.B., M.D., F.A.C.S. Formerly Director of Obstetrics, Detroit General Hospital; Consulting Obstetrician to the House of Providence Hospital; Consulting Pathologist to the Woman's Hospital and Infant's Home; Obstetrician-in-Chief to the Hanna Schloss Dispensary. *Council*, 1917. R. F. D. No. 3, Pontiac, Mich.

1921.—MORSE, ARTHUR H., A.B., M.D., F.A.C.S. Professor of Obstetrics and Gynecology, Yale School of Medicine; Obstetrician and Gynecologist-in-Chief, New Haven Hospital and Dispensary. 71 College Street, New Haven, Conn.

1904.—NEWELL, FRANKLIN SPILMAN, A.B., M.D., F.A.C.S. Obstetrician to Massachusetts General Hospital; Visiting Obstetrician, Boston Lying-in Hospital; Professor of Clinical Obstetrics, Harvard University. *Council*, 1912–1915. 443 Beacon Street, Boston, Mass.

1894.—NEWMAN, HENRY PARKER, A.M., M.D., F.A.C.S. Professor Emeritus of Gynecology, University of Illinois College of Medicine, Chicago, and in the Chicago Polyclinic Medical School and Hospital; formerly President of Chicago Post-Graduate Medical School and Chairman of Section on Obstetrics and Gynecology of American Medical Association; Founder and President of Marion Sims' Hospital, Chicago, 1895–1908; U. S. Secretary of Section on Abdominal Surgery and Gynecology, Pan-American Congress, 1901–08; A Founder-Member of the Congrés Periodique Internationale de Gynécologie et d'Obstétrique; Attending Surgeon and Gynecologist, Agnew Hospital and San Diego County Hospital. *Vice-President*, 1921. 1560 Eighth Street, San Diego, Calif.

Digitized by Google

1916.—NICHOLSON, WILLIAM R., A.B., M.D. Gynecologist to Methodist and Polyclinic Hospitals; Obstetrician to Presbyterian Hospital; Associate in Obstetrics, University of Pennsylvania; Professor of Gynecology in Graduate School of Medicine, University of Pennsylvania. 2023 Spruce Street, Philadelphia, Penn.

1902.—NOBLE, GEORGE HENRY, M.D., D.C.L., F.A.C.S. Gynecologist to the Grady Hospital; Professor of Clinical Gynecology, Atlanta Medical College. *Vice-President,* 1913. 980 Peachtree Street, Atlanta, Ga.

1914.—NORRIS, CHARLES C., M.D., F.A.C.S. Associate in Gynecology, University of Pennsylvania; Assistant Gynecologist to the University of Pennsylvania Hospital; Consultant Gynecologist and Obstetrician to The Henry Phipps Institute; Gynecologist to the Children's Hospital. Twenty-second and Chestnut Streets, Philadelphia, Penn.

1893.—NORRIS, RICHARD C., A.M., M.D. Professor of Obstetrics, Graduate School of Medicine; Assistant Professor of Obstetrics, Medical Department, University of Pennsylvania; Surgeon-in-Charge, Preston Retreat; Gynecologist to the Methodist Episcopal Hospital; Consulting Gynecologist, Friends' Asylum, Frankford; Consulting Obstetrician, Germantown Hospital; Consulting Obstetrician and Gynecologist, Philadelphia Hospital. 500 North Twentieth Street, Philadelphia, Penn.

1897.—PETERSON, REUBEN, A.B., M.D., F.A.C.S. Professor of Obstetrics and Gynecology, University of Michigan; Obstetrician and Gynecologist to the University of Michigan Hospital. *Vice-President,* 1906. *President,* 1911. *Council,* 1912–1915. Ann Arbor, Michigan.

1908.—POLAK, JOHN OSBORN, M.Sc., M.D., F.A.C.S. Professor of Obstetrics and Gynecology, Long Island College Hospital; Obstetrician and Gynecologist to the College Hospital; Consulting Obstetrician to the Methodist Episcopal Hospital; Gynecologist to the Jewish Hospital; Consulting Gynecologist to the Coney Island, Williamsburg, Deaconess', Zion and People's Hospital; Consulting Obstetrician and Gynecologist to Southampton Hospital; Consulting Obstetrician to Mary Hitchcock Hospital, Hanover, New Hampshire. *Council,* 1921. 20 Livingston Street, Brooklyn, N. Y.

1917.—POMEROY, RALPH H., B.A., M.A., M.D., F.A.C.S. Associate Professor of Obstetrics and Gynecology, Long Island College Hospital; Consulting Obstetrician, St. John's, Bushwick, Kings County and Methodist Episcopal Hospitals; Attending Gynecologist and Obstetrician, Brooklyn Hospital. 93 Remsen Street, Brooklyn, New York.

1915.—RAWLS, REGINALD M., A.B., M.D., F.A.C.S. Junior Attending Surgeon to the Woman's Hospital in the State of New York; Secretary of New York Obstetrical Society. 350 West Eighty-eighth Street, New York.

1916.—REED, CHARLES ALFRED LEE, A.M., M.D., F.A.C.S. Professor Emeritus of Gynecology, Medical Department, University of Cincinnati; Consulting Gynecologic Surgeon, Cincinnati General Hospital. 5 West Eighth Street, Cincinnati, Ohio.

1920.—RICHARDSON, EDWARD H., A.B., M.D., F.A.C.S. Associate in Clinical Gynecology, Johns Hopkins University; Gynecologist-in-charge, Out-patient Gynecologic Clinic, Johns Hopkins Hospital; Visiting Gynecologist, Union Protestant Infirmary; Church Home and Infirmary; Hebrew Hospital; Hospital for Women of Maryland; Assistant Visiting Gynecologist, Johns Hopkins Hospital. 1200 North Charles Street, Baltimore, Md.

1917.—RUSSELL, WILLIAM WOOD, A.M., M.D. Associate Professor of Gynecology and Assistant Gynecologist to Johns Hopkins Hospital; Gynecologist, Hospital for the Woman of Maryland; Union Protestant Infirmary. Care of Dr. J. M. Slemons, 819 Pacific Mutual Building, Los Angeles, Cal.

Digitized by Google

1906.—SAMPSON, JOHN A., A.M., M.D. Professor of Gynecology, Albany Medical College; Gynecologist to the Albany Hospital. *Council*, 1911. *Vice-President*, 1912. 180 Washington Avenue, Albany, New York.

1914.—SCHUMANN, EDWARD A., A.B., M.D. Lecturer on Obstetrics, Jefferson Medical College; Gynecologist and Obstetrician, Philadelphia General Hospital; Gynecologist, Frankford Hospital; Assistant Obstetrician, Jefferson Medical College Hospital; Consulting Gynecologist, Rush Hospital for Tuberculosis. 124 South Eighteenth Street, Philadelphia, Penn.

1907.—SIMPSON, FRANK FARROW, A.B., M.D., F.A.C.S. *Vice-President*, 1915. *President*, 1917. *Council*, 1917–1921. 7048 Jenkins Arcade Building, Pittsburgh, Penn.

1914.—SLEMONS, JOSIAH MORRIS, A.B., A.M., M.D., F.A.C.S. Formerly Professor of Obstetrics and Gynecology, Yale University; Formerly Chief Obstetrician and Gynecologist, New Haven Hospital and Dispensary. *Council*, 819 Pacific Mutual Building, Los Angeles, Cal.

1905.—SMITH, RICHARD R., M.D., F.A.C.S. Surgeon to Butterworth and Blodgett Hospitals. *Council*, 1911. *Vice-President*, 1912. Grand Rapids, Mich.

1918.—SPALDING, ALFRED B., A.B., M.D. Professor of Obstetrics and Gynecology, Stanford University School of Medicine; Executive of Division, Obstetrics and Gynecology, Lane Hospital. 2651 Green Street, San Francisco, Calif.

1905.—STONE, WILLIAM STEPHEN, A.B., M.D. Clinical Director of Cancer Research Memorial Hospital, New York. 162 East Sixty-third Street, New York.

1909.—STUDDIFORD, WILLIAM EMERY, B.A., M.A., M.D., F.A.C.S. Professor of Obstetrics and Gynecology, Columbia University, College of Physicians and Surgeons; Director of the Sloane Hospital for Women; Consulting Gynecologist to the Presbyterian Hospital, New York; Consulting Obstetrician to the New York Nursery and Child's Hospital, New York; Consulting Surgeon to the Franklin Hospital, Franklin, N. J. *Council*, 1914. *Vice-President*, 1919. 124 East Thirty-sixth Street, New York.

1906.—TAUSSIG, FREDERICK JOSEPH, A.B., M.D., F.A.C.S. Associate in Gynecology, Washington University; Gynecologist to Barnard Free Skin and Cancer Hospitals; Obstetrician to St. Louis Maternity Hospital; Gynecologist to the St. John's Hospital; St. Louis City Hospital, and City Sanitarium; Associate Gynecologist, Barnes Hospital. *Council*, 1915. 3519 Washington Avenue, St. Louis, Mo.

1905.—TAYLOR, HOWARD C., PH.B., M.D., F.A.C.S. Attending Gynecologist, Roosevelt Hospital; Professor of Clinical Gynecology, Columbia University; Consulting Gynecologist, Sloane Hospital for Women, Tarrytown, Stamford, Greenwich and Sharon (Conn.) Hospitals and Memorial Hospital, Pawtucket, R. I. *Vice-President*, 1914 and 1915. 32 West Fiftieth Street, New York.

1898.—THOMPSON, JOHN F., A.M., M.D., F.A.C.S. Professor of Diseases of Women, Medical School of Maine (now Bowdoin Medical College); Surgeon, Maine General Hospital; Consulting Gynecologist, Webber Hospital, Biddeford. *Vice-President*, 1911. 211 State Street, Portland, Maine.

1897.—VINEBERG, HIRAM N., M.D., F.A.C.S. Consulting Gynecologist to Mt. Sinai Hospital; Gynecologist-in-Chief, Beth Moses Hospital; Consulting Gynecologist to the Montefiore Home for Chronic Invalids. 751 Madison Avenue, New York.

1903.—WAKEFIELD, W. FRANCIS B., M.B., M.D., C.M., F.A.C.S. *Vice-President*, 1917. 1065 Sutter Street, San Francisco, Calif.

Digitized by Google

1909.—Ward, George Gray, Jr., M.D., F.A.C.S. Chief Surgeon of the Woman's Hospital in the State of New York; Professor of Obstetrics and Gynecology, Cornell University Medical College; Emeritus Professor of Gynecology, New York Post-Graduate Medical School; formerly Gynecologist to Bellevue Hospital; Consulting Gynecologist to New York Post-Graduate Hospital, Monmouth Memorial Hospital, Long Branch, N. J., the Italian Hospital and the Booth Memorial Hospital, New York City. Consulting Obstetrician, Berwind Maternity Clinic. *Council*, 1913. *Secretary*, 1917–1921. 48 East Fifty-second Street, New York.

1896.—Watkins, Thomas J., M.D., F.A.C.S. Professor of Gynecology, Northwestern University Medical School; Gynecologist to St. Luke's Hospital, Chicago. *Vice-President*, 1914. *President*, 1915. *Council*, 1916–1919. 104 S. Michigan Avenue, Chicago, Ill.

1915.—Watson, Benjamin P., M.B., Ch.B., M.D., F.R.C.S., F.A.C.S. Professor of Obstetrics and Gynecology, University of Toronto; Obstetrician and Gynecologist-in-Chief, Toronto General Hospital. *Council*, 1919. 14 Madison Avenue, Toronto, Canada.

1898.—Webster, J. Clarence, B.A., M.D., Hon. D.Sc. (Edin.), F.R.C.P.E., F.R.S.E., F.A.C.S., D.Sc. (Hon.). Emeritus Professor of Obstetrics and Gynecology, Rush Medical College, University of Chicago; Gynecologist, Prebyterian and St. Joseph's Hospitals; Fellow of the Edinburgh Obstetrical Society; Corresponding Member of the Royal Academy of Palermo, Italy, and of the Italian Obstetrical and Gynecological Society. *Vice-President*, 1920. Shediac, N. B., Canada.

1892.—Williams, J. Whitridge, A.B., M.D., ScD., LL.D., F.A.C.S. Professor of Obstetrics and Dean, Medical Department of Johns Hopkins University; Obstetrician-in-Chief to the Johns Hopkins Hospital; Honorary President, Glasgow Gynecological and Obstetrical Society, 1910–12; President, American Association for the Prevention of Infant Mortality, 1913–1914; President, Medical and Chirurgical Faculty of Maryland, 1916; Honorary Fellow, Edinburgh Obstetrical Society, etc. *Council*, 1899. *Vice-President*, 1904. *President*, 1914. *Council*, 1915–1918. Johns Hopkins Hospital, Baltimore, Md.

1917.—Young, Ernest Boyen, A.B., M.D. Surgeon-in-Chief, Gynecological and Obstetrical Section, Fifth Surgical Service, Boston City Hospital; Surgeon, Massachusetts Women's Hospital; Instructor, Gynecological Department, Harvard Medical School. 434 Marlborough Street, Boston, Mass.

Total, Ninety-three Active Fellows.

Digitized by Google

Digitized by Google

ACTIVE FELLOWS

CLASSIFIED

California

Lynch, Frank W., 2511 Broadway, San Francisco.
Newman, Henry Parker, 1560 Eighth Street, San Diego.
Russell, Wm. Wood, Care Slemons, 819 Pacific Mutual Building, Los Angeles.
Slemons, Josiah Morris, 819 Pacific Mutual Building, Los Angeles.
Spalding, Alfred B., 2651 Green Street, San Francisco.
Wakefield, W. Francis, 1065 Sutter Street, San Francisco.

Canada

Chipman, Walter William, 285 Mountain Street, Montreal.
Goodall, James R., 377 Mountain Street, Montreal.
Little, Herbert M., 285 Stanley Street, Montreal.
Watson, Benjamin P., 14 Madison Avenue, Toronto.
Webster, J. Clarence, Shediac, N. B.

Colorado

Frank, Robert Tilden, 511 Majestic Building, Denver.

Connecticut

Morse, Arthur H., 71 College Street, New Haven.

District of Columbia

Bovée, J. Wesley, The Rochambeau, 815 Connecticut Avenue, Washington.
Miller, Gideon Brown, 1730 K. Street, N. W., Washington.

Georgia

Noble, George Henry, 980 Peachtree Street, Atlanta.

Illinois

Andrews, Frank T., 448 Barry Avenue, Chicago.
Barrett, Channing Whitney, 4245 North Ashland Avenue, Chicago.

Digitized by Google

Byford, Henry T., Michigan Avenue and Adams Street, Chicago.
Culbertson, Carey, 30 North Michigan Avenue.
Curtis, Arthur H., 104 South Michigan Avenue, Chicago.
Danforth, William C., 1620 Hinman Avenue, Evanston.
De Lee, Joseph B., 5028 Ellis Avenue, Chicago.
Heaney, Noble Sproat, 104 South Michigan Avenue, Chicago.
Holmes, Rudolph W., 30 North Michigan Avenue, Chicago.
Martin, Franklin H., 30 North Michigan Avenue, Chicago.
Watkins, Thomas J., 104 South Michigan Avenue, Chicago.

Kentucky

McMurtry, Lewis S., Francis Building, Louisville.

Louisiana

Clark, Samuel M.D., 108 Baronne Street, New Orleans.
Miller, Charles Jefferson, 124 Baronne Street, New Orleans.

Maine

Thompson, John F., 211 State Street, Portland.

Maryland

Burnam, Curtis F., 1418 Eutaw Place, Baltimore.
Casler, De Witt B., 13 West Chase Street, Baltimore.
Cullen, Thomas S., 20 East Eager Street, Baltimore.
Hunner, Guy L., 2305 St. Paul Street, Baltimore.
Kelly, Howard A., 1418 Eutaw Place, Baltimore.
Richardson, Edward H., 1200 North Charles Street, Baltimore.
Williams, J. Whitridge, Johns Hopkins Hospital, Baltimore.

Massachusetts

Burrage, Walter L., 42 E. Eliot Street, Jamaica Plain, Boston.
Graves, William P., 244 Marlborough Street, Boston.
Hutchins, Henry Talbot, 520 Commonwealth Avenue, Boston.
Newell, Franklin Spilman, 443 Beacon Street, Boston.
Young, Ernest Boyen, 434 Marlborough Street, Boston.

Michigan

Manton, Walter Porter, 32 Adams Avenue, Detroit.
Morley, William Horace, R. F. D. 3, Pontiac.
Peterson, Reuben, Ann Arbor.
Smith, Richard R., Grand Rapids.

Digitized by Google

Minnesota

Adair, Fred L., 730 La Salle Building, Minneapolis.
Litzenberg, Jennings C., 1009 Nicollet Avenue, Minneapolis.

Missouri

Crossen, Harry Sturgeon, Metropolitan Building, St. Louis.
Ehrenfest, Hugo, 4333 McPherson Avenue, St. Louis.
Gellhorn, George, 713 Metropolitan Building, St. Louis.
Taussig, Frederick Joseph, 3519 Washington Avenue, St. Louis.

Nebraska

Findley, Palmer, 670 Brandeis Theatre Building, Omaha.

New Jersey

Harris, Philander A., 26 Church Street, Paterson.

New York

Bailey, Harold C., 22 East Sixty-eighth Street, New York.
Bissell, Dougal, 219 West Seventy-ninth Street, New York.
Brettauer, Joseph, 1063 Madison Avenue, New York.
Broun, Le Roy, 148 West Seventy-seventh Street, New York.
Child, Charles Gardner, 163 East Seventy-first Street, New York.
Dickinson, Robert L., 13 East Sixty-fifth Street, New York.
Edgar, James Clifton, 28 West Fifty-sixth Street, New York.
Farrar, Lilian K. P., 611 West 110th Street, New York.
Holden, Frederick C., 13 East Sixty-fifth Street, New York.
King, James E., 1248 Main Street, Buffalo.
Kosmak, George W., 23 East Ninety-third Street, New York.
Polak, John Osborn, 20 Livingston Street, Brooklyn.
Pomeroy, Ralph H., 93 Remsen Street, Brooklyn.
Rawls, Reginald M., 350 West Eighty-eighth Street, New York.
Sampson, John A., 180 Washington Avenue, Albany.
Stone, William S., 162 East Sixty-third Street, New York.
Studdiford, William Emery, 124 East Thirty-sixth Street, New York
Taylor, Howard C., 32 West Fiftieth Street, New York.
Vineberg, Hiram N., 751 Madison Avenue, New York.
Ward, George Gray, Jr., 48 East Fifty-second Street, New York.

Ohio

Reed, Charles A. L., 5 West Eighth Street, Cincinnati.

Pennsylvania

Anspach, Brooke M., 1827 Spruce Street, Philadelphia.
Carroll, Thomas B., Jenkins Arcade Building, Pittsburgh.
Chalfant, Sidney A., 7048 Jenkins Arcade Building, Pittsburgh.

Digitized by Google

Clark, John G., 2017 Walnut Street, Philadelphia.
Davis, Edward P., 250 South Twenty-first Street, Philadelphia.
Foulkrod, Collin, 3910 Chestnut Street, Philadelphia.
Hirst, Barton Cooke, 1821 Spruce Street, Philadelphia.
Huggins, Raleigh R., 1018 Westinghouse Building, Pittsburgh.
Keene, Floyd E., Medical Arts Building, Philadelphia.
McGlinn, John A., 113 South Twentieth Street, Philadelphia.
Montgomery, Edward E., 1426 Spruce Street, Philadelphia.
Nicholson, William R., 2023 Spruce Street, Philadelphia.
Norris, Charles C., Twenty-second and Chestnut Streets, Philadelphia.
Norris, Richard C., 500 North Twentieth Street, Philadelphia.
Schumann, Edward A., 124 South 18th Street, Philadelphia.
Simpson, Frank Farrow, 7048 Jenkins Arcade Building, Pittsburgh.

Wisconsin

Davis, Carl Henry, 141 Wisconsin Street, Milwaukee.

Digitized by Google

ACTIVE FELLOWS

DECEASED

Elected		Died
Founder.	ATLEE, WASHINGTON L., M.D.	1877
Founder.	BARKER, FORDYCE, M.D., LL.D.	1891
1913.	BRICKNER, SAMUEL M., A.M., M.D.	1916
Founder.	BUCKINGHAM, CHARLES E., M.D.	1877
Founder.	BYFORD, WILLIAM H., M.D., LL.D.	1890
Founder.	BYRNE, JOHN, M.D., M.R.C.S.E.	1902
1888.	COLEMAN, JOHN SCOTT, M.D.	1892
1896.	CRAGIN, EDWIN B., A.B., A.M., M.D., F.A.C.S.	1918
Founder.	DRYSDALE, THOMAS M., A.M., M.D.	1904
1889.	DUDLEY, A. PALMER, M.D.	1905
1891.	EDEBOHLS, GEORGE M., A.M., M.D.	1908
Founder.	ENGELMANN, GEORGE J., A.M., M.D.	1903
1890.	ETHERIDGE, JAMES H., A.M., M.D.	1899
1902.	FREDERICK, CARLTON C., B.S., M.D.	1911
1909.	GARCEAU, EDGAR, M.D.	1913
Founder.	GOODELL, WILLIAM, A.M., M.D., LL.D.	1895
1887.	HANKS, HORACE TRACY, M.D., LL.D.	1900
1894.	HENROTIN, FERNAND, M.D.	1906
1892.	HOLMES, HORATIO R., M.D.	1896
1885.	HUNTER, JAMES B., M.D.	1889
1877.	JACKSON, A. REEVES, A.M., M.D.	1892
1889.	JAGGARD, W. W., M.D.	1896
Founder.	JENKS, EDWARD W., M.D., LL.D	1903
1885.	JEWETT, CHARLES, A.M., M.D., Sc.D.	1911
1886.	JOHNSTONE, ARTHUR W., A.M., M.D.	1905
1892.	KEATING, JOHN M., M.D., LL.D.	1893
1886.	KING, ALBERT F. A., A.M., M.D., LL.D.	1915
1888.	KOLLOCK, CORNELIUS, A.M., M.D.	1897
1881.	LEE, CHARLES C., A.M., M.D., LL.D.	1893
Founder.	LUSK, WILLIAM T., A.M., M.D., LL.D.	1897
1892.	MacMONAGLE, BEVERLY, M.D.	1912
1891.	MOSELY, WILLIAM E., M.D., F.A.C.S.	1916
Founder.	MUNDÉ, PAUL F., M.D., LL.D.	1902
1890.	MURRAY, ROBERT A., M.D.	1909
Founder.	PARVIN, THEOPHILUS, M.D., LL.D.	1898
Founder.	PEASLEY, E. RANDOLPH, M.D., LL.D.	1880
1881.	POLK, WILLIAM M., M.D., LL.D., F.A.C.S.	1918
1892.	PRYOR, WILLIAM R., M.D.	1904
1911.	SCHENCK, BENJAMIN R., M.D.	1920
Founder.	SKENE, ALEXANDER J. C., M.D.	1900
Founder.	SMITH, ALBERT H., M.D.	1886
1891.	STRONG, CHARLES P., A.B., M.D.	1893

Digitized by Google

Elected		Died
Founder.	TRASK, JAMES D., M.D.	1883
1891.	WATHEN, WILLIAM H., M.D.	1913
Founder.	WALLACE, ELLERSLIE, M.D.	1885
1902.	WELLS, BROOKS H., M.D., F.A.C.S.	1917
1916.	WERDER, XAVIER OSWALD, M.D., F.A.C.S.	1919
Founder.	WHITE, JAMES P., M.D.	1881
1887.	WILSON, ELWOOD, M.D.	1889
Founder.	WILSON, HENRY P. C., M.D.	1898

Digitized by Google

ACTIVE FELLOWS

RESIGNED

Elected		Resigned
Founder.	BIXBY, GEORGE H., M.D.	1889
1896.	BOISE, EUGENE, A.B., M.D.	1918
1878.	BOZEMAN, NATHAN, M.D.	1886
1894.	BUCKMASTER, A. HARPER, M.D.	1908
1893.	CUSHING, ERNEST W., A.B., LL.D., M.D.	1916
1895.	EMMET, JOHN DUNCAN, M.D.	1909
1881.	FOSTER, FRANK P., M.D.	1895
1881.	GILLETTE, WALTER R., M.D.	1889
1877.	GOODMAN, JOHN, M.D.	1892
1890.	*GRANDIN, EGBERT H., M.D.	1913
1891.	*HARDEN, VIRGIL O., M.D.	1894
Founder.	INGHAM, JAMES V., M.D.	1889
1895.	JARMAN, GEORGE W., A.M., M.D.	1917
Founder.	LYMAN, GEORGE H., M.D.	1885
1891.	MacLAREN, ARCHIBALD, M.D.	1903
1895.	PENROSE, CHARLES B., A.M., Ph.D., M.D.	1912
Founder.	PENROSE, RICHARD A. F., M.D., LL.D.	1886
1877.	REYNOLDS, JOHN P., M.D.	1896
1892.	RICHIE, PARK, M.D.	1894
1881.	*SAWYER, EDWARD W., A.M., M.D.	1899
1879.	SCOTT, JOHN, M.D., F.R.C.S.I.	1886
1886.	*SIMS, H. MARION, M.D.	1901
Founder.	SIMS, J. MARION, M.D., LL.D.	1883
Founder.	SINCLAIR, ALEXANDER D., M.D.	1882
1892.	SMITH, A. LAPTHORN, M.D., M.R.C.S.	1912
1898.	STONE, ISAAC S., M.D.	1918
1891.	*TUTTLE, GEORGE M., A.B., M.D.	1896

* Due to requirements of Constitution and By-Laws.

Digitized by Google

Digitized by Google

MINUTES OF THE PROCEEDINGS

AT THE

FORTY-SIXTH ANNUAL MEETING

OF THE

AMERICAN GYNECOLOGICAL SOCIETY

HELD AT

SWAMPSCOTT, MASSACHUSETTS

JUNE 2, 3 AND 4, 1921

Digitized by Google

Digitized by Google

FORTY-SIXTH ANNUAL MEETING

SWAMPSCOTT, MASSACHUSETTS, JUNE 2, 3 AND 4, 1921

The following Active Fellows were present:

ADAIR, FRED L.
ANSPACH, BROOKE M.
BAILEY, HAROLD C.
BOVÉE, J. WESLEY
BRETTAUER, JOSEPH
BROUN, LE ROY
BYFORD, HENRY T.
CHALFANT, SIDNEY A.
CHIPMAN, WALTER W.
CLARK, SAMUEL M. D.
CURTIS, ARTHUR H.
DAVIS, EDWARD P.
DAVIS, CARL HENRY
DICKINSON, ROBERT L.
DE LEE, JOSEPH B.
DANFORTH, WILLIAM C.
EDGAR, J. CLIFTON
EHRENFEST, HUGO
FINDLEY, PALMER
FOULKROD, COLLIN
GRAVES, WILLIAM P.
HARRIS, PHILANDER A.
HEANEY, NOBLE SPROAT
HOLDEN, FREDERICK C.
HOLMES, RUDOLPH W.
HUGGINS, RALEIGH R.
HUTCHINS, HENRY T.
KING, JAMES E.
KEENE, FLOYD E.
KOSMAK, GEORGE W.
MCGLINN, JOHN A.
MARTIN, FRANKLIN H.
MILLER, C. JEFFERSON
MILLER, G. BROWN
MORSE, ARTHUR H.
NEWELL, FRANKLIN S.
NEWMAN, HENRY PARKER
NORRIS, CHARLES C.
POLAK, JOHN O.
POMEROY, RALPH H.
RAWLS, REGINALD M.
RICHARDSON, EDWARD H.
SAMPSON, JOHN A.
SCHUMANN, EDWARD A.
SMITH, RICHARD R.
STONE, WILLIAM S.
STUDDIFORD, WILLIAM E.
TAUSSIG, FREDERICK J.
THOMPSON, JOHN F.
VINEBERG, HIRAM N.
WARD, GEORGE GRAY, JR.
WATKINS, THOMAS J.
WEBSTER, J. CLARENCE
YOUNG, ERNEST B.

The following Honorary Fellows were present:

CLEVELAND, CLEMENT
DAVENPORT, FRANCIS H.
GOFFE, J. RIDDLE
GREEN, CHARLES M.
REYNOLDS, EDWARD
ROBB, HUNTER

FIRST DAY, *Thursday, June* 2, 1921

The Society met at the New Ocean House, and was called to order at 10 A.M. by the President, Dr. Walter W. Chipman, Montreal, Canada.

The Secretary called the roll.

Digitized by Google

The next order of business being the reception of guests, the Secretary announced that those gentlemen who had accepted the invitation to contribute papers and discussions were the official guests of the Society. They are: William Blair Bell, Liverpool, England; Dr. Irving Potter, Buffalo; Dr. Joseph L. Baer, Chicago; Dr. Donald Macomber, Boston; Dr. Merit D. Haag, Ann Arbor, Mich.; Dr. I. C. Rubin, New York; Dr. Wm. A. Scott, Toronto; Dr. Carey Culbertson, Chicago.

Upon motions made by several Fellows the following gentlemen were also made guests and invited to participate in the discussions: Dr. C. W. Anderson, Los Angeles, Cal.; Dr. R. J. Sagerson, Watertown, N. Y.; Dr. E. Gustav Zincke, Cinn.; Dr. Harry G. Dorman, Beirut, Syria; Dr. Theodore Danna, Paterson, N. J.; Dr. Walt P. Conaway, Atlantic City, N. J.; Dr. Dornan Beira, Lynn, Mass.; Dr. J. J. Mundell, Washington, D. C.; Dr. G. V. Meigs, Boston, Mass.; Dr. John T. Williams, Boston, Mass.; Dr. F. A. Pemberton, Boston, Mass.; Dr. Nathaniel R. Mason, Boston, Mass.; Dr. H. T. Swain, Boston, Mass.; Dr. J. C. Aub, Boston, Mass.; Dr. Samuel H. Geist, New York City; Dr. William F. Pfeiffer, Brooklyn, N. Y.

The Secretary stated that he had received letters and telegrams from Drs. J. Whitridge Williams, Reuben Peterson, Lewis S. McMurtry, Benjamin P. Watson, J. M. Slemons, John G. Clark, E. E. Montgomery, Howard A. Kelly, W. P. Manton and Alfred Spalding, regretting their inability to attend and expressing their wishes for a successful meeting.

The President then introduced Dr. Edward Reynolds, of Boston, who delivered the following:

Address of Welcome

Mr. President and Fellows of the American Gynecological Society: The old Bay State welcomes you again with pleasure and is grateful to you for coming. You have chosen this time to avoid our capital city, and we congratulate you on your taste. Here at Swampscott you will have better and purer air, and your hours of recreation will be more easily and pleasantly spent.

You have chosen, although it does not look so today, a spot that was formerly typical of New England. New England long got its living by the sea, and Swampscott was a fishing center up to a few years ago. When the old Ocean House, which preceded this building, was first put up there was nothing in view at the western end but a collection of fishing huts and boathouses that lay to the inside of a dusty road that winds around the shore. One could see dories almost side by side from one end of the beach to the other, and a most characteristic feature of Swampscott was the high wheels with low-hung axles between them on which the dories were run up and down the long beach at low tide. Fishing schooners lay off the beach from Marblehead to Nahant. When I first remembered this shore I spent most of my summers at the promontory across the way, and from here to Marblehead there were practically no buildings except four or five dilapidated farmhouses surrounded by great fields of onions which the soil seemed peculiarly adapted to. When we drive out tomorrow for lunch, near Marblehead, you will not see many onions, but in place of them that mushroom of modern civilization, the summer cottage, which are now as thick as the onions were in years gone by.

Mr. President and Fellows, we welcome you with pleasure.

In the absence of Dr. Reuben Peterson, who was to have responded to the address of welcome, Dr. Thomas J. Watkins, Chicago, was called upon to perform this pleasant duty.

Digitized by Google

Response to the Address of Welcome

by Dr. Thomas J. Watkins, Chicago

Mr. President and Fellows of the Society: I am rather embarrassed to appear here in the place of Dr. Peterson, because I cannot respond to this fine address of welcome as well as he could have done. In fact, I am rather at a loss to know why I should be asked to respond unless it is we are indulging in this condition of relativity, and we are both considered from the west for the same reason that the people in California consider us from the east.

We are always very much pleased to come to Boston for these meetings, and I observe the older we are getting, the more ready we are to come here. We never make an effort without first generating a desire, and I have been trying to discover what this desire is that induces us to come to Boston whenever we have an opportunity and why this desire should increase with age.

It would rather seem from a study of this subject that the first thing we associate with Boston is the great intelligence and culture of its people, and I take it, we come here largely to be sensitized and to remain in a state of fruition.

In the name of the Society, I wish to thank the Fellows from Boston for this very cordial welcome.

The President announced the Nominating Committee in accordance with the By-Laws as follows: Five last ex-Presidents, Drs. J. Wesley Bovée, Frank F. Simpson, John G. Clark, Franklin H. Martin, Robert L. Dickinson, and three Active Fellows appointed by the President, Edward P. Davis, Richard R. Smith and C. Jeff Miller.

The President called attention to the scientific exhibit and expressed his gratitude to those who had arranged it. He said it was a step in the right direction, and expressed the hope it would be continued at future meetings.

The Secretary made the following announcements.

On Thursday, June 2, the afternoon will be devoted to recreation. There are ample facilities for golf, tennis, sailing, bathing and motoring.

A "get-together dinner" of the Society and its guests will be held at the New Ocean House at seven o'clock.

On Friday, June 3, the Boston Fellows will entertain the Society and its guests at luncheon at the Eastern Yacht Club, Marblehead, Mass., at 1.30 o'clock. Conveyances will be ready immediately after the close of the Scientific Session. The afternoon will be devoted to recreation. The President, Dr. Walter W. Chipman will entertain the Society and its guests at dinner at the New Ocean House at seven o'clock.

Saturday, June 4, the afternoon will be devoted to recreation. Arrangements have been made with the Tedesco Country Club for the privilege of the links and courts on payment of the ordinary green's fees.

The President called attention to a rule of the Society that the reading of papers is limited to twenty minutes and discussions to five minutes.

Scientific Session

Papers were read as follows:

Symposium: "To What Extent Should Delivery be Hastened or Assisted by Operative Interference?"

Digitized by Google

1. "Fads and Fancies of Obstetrics; a Comment on the Pseudo-Scientific Trend of Modern Obstetrics," by Dr. Rudolph W. Holmes, Chicago, Illinois.

2. "Forced Labor—Its Status," by Dr. John Osborn Polak, Brooklyn, New York.

3. "The Drudgery of Obstetrics, with Some Suggestions for Relief," by Dr. Brooke M. Anspach, Philadelphia, Pennsylvania.

These three papers were discussed together by Drs. Potter, De Lee, Pomeroy, Harris, E. P. Davis, Stone, Kosmak, Newell, Dickinson, Bovée, McGlinn, Heaney, Ehrenfest, C. H. Davis, Bailey, Adair, and discussion closed by Drs. Holmes and Polak.

4. "Basal Metabolism in Pregnancy and the Puerperium," by Dr. Joseph L. Baer, Chicago, Illinois (by invitation).

The discussion was opened by Dr. J. C. Aub, Boston (by invitation), and continued by E. P. Davis, Foulkrod, and in closing by the essayist.

5. "A Comparison by Statistical Methods of Certain External Pelvic Measurements of French and American Women," by Dr. Fred L. Adair, Minneapolis, Minnesota, which was discussed by Drs. Ehrenfest, E. P. Davis, Holmes, and in closing by the essayist.

6. "Acute Malignant Endocarditis Complicating Pregnancy," by Dr. Palmer Findley, Omaha, Nebraska.

On motion, the Society adjourned until 9 A.M., Friday, June 3.

SECOND DAY, *Friday, June* 3, 1921

Morning Session. The Society met at 9 A.M. and was called to order by the President.

7. "Vaginal Supracervical Hysterectomy with Interposition of the Cervical Stump for Cystocele and Procidentia, associated with Enlargement of the Uterus," by Dr. Hiram N. Vineberg, New York City.

Discussed by Drs. Watkins, Ward, Miller, Goffe, McGlinn, Dickinson, Bovée, and in closing by the essayist.

8. "The Interpretation of Vesical Symptoms in Gynecological Diagnosis," by Dr. Floyd E. Keene, Philadelphia, Pennsylvania, which was discussed by Drs. Polak, Anspach, Dickinson, Richardson, Ward, Byford, and in closing by the author of the paper.

9. "Certain Dietary Factors in the Causation of Sterility in Rats, with Special Reference to the Histology," by Dr. Edward Reynolds and Dr. Donald Macomber (by invitation), Boston, Massachusetts.

This paper was read by Dr. Macomber and the discussion was opened by Dr. Reynolds and continued by Drs. Blair Bell (by invitation), and E. P. Davis and in closing by Dr. Macomber.

10. "Pneumoperitoneum and Roentgenography as Aids to More Accurate Obstetric and Gynecologic Diagnosis," by Dr. Reuben Peterson, Ann Arbor, Michigan.

In the absence of Dr. Peterson, the subject was presented by Dr. Merit D. Haag (by invitation), Ann Arbor, Michigan.

The discussion was opened by Drs. I. C. Rubin (by invitation), and George Gray Ward, Jr. and continued by Drs. Reynolds, Dickinson, Richardson and Baer, after which the discussion was closed by Dr. Haag.

At this juncture, Dr. Henry P. Newman, First Vice-President, took the Chair, and President Chipman delivered his address. He selected for his subject: "American Gynecology." At the conclusion of his address, Dr. Edward P. Davis moved that a vote of thanks be extended to Dr. Chipman for his exceedingly interesting, valuable, and delightful address. Seconded and unanimously carried.

On motion, the Society adjourned until 9 P.M.

Digitized by Google

Business Meeting

The business meeting was held at the Eastern Yacht Club, Marblehead, Massachusetts, on Friday, June 3, 1921, at 3.15 P.M., with the President, Dr. Walter W. Chipman, in the chair.

The minutes of the preceding meeting were presented by the Secretary as published in the *Transactions*, and on motion, seconded and carried, they were adopted as printed.

The Secretary rendered his report as follows:

No resignations have been received during the year, but there have been seven deaths, viz:

Dr. D. Berry Hart, died June 10, 1920, an Honorary Fellow.
Dr. Benjamin R. Schenck, died June 30, 1920, an Active Fellow.
Dr. Benjamin F. Baer, died September 11, 1920, an Honorary Fellow.
Dr. John C. Reeve, died September 15, 1920, an Honorary Fellow and Founder.
Dr. Matthew D. Mann, died March 3, 1921, an Honorary Fellow.
Dr. Joseph T. Johnson, died March 12, 1921, an Honorary Fellow and Founder.
Dr. Bache McE. Emmet, died May 27, 1921, an Honorary Fellow.

Transfers to the Honorary List have been made on request of

Dr. J. Riddle Goffe, elected in 1891; Dr. Malcolm McLean, elected in 1892; Dr. Florian Krug, elected in 1891; Dr. Cyrus A. Kirkley, elected in 1892; Dr. Hunter Robb, elected in 1896, they having served twenty-five years as Active Fellows and have complied with all the requirements of the By-Laws. These changes leave the Fellowship of the Society with 89 Active Fellows and 11 vacancies.

It was moved, seconded and carried that the Secretary's report be accepted and placed on file.

The Treasurer's report was presented and after being audited and reported correct by the auditing committee, consisting of Drs. Arthur H. Curtis and Dr. G. Brown Miller, it was accepted and placed on file.

The Secretary presented the report of the Council as follows:

On recommendation of the Council it was moved, seconded and carried that an assessment of $10 be made this year to meet the increased expenses.

The Council recommended to the Society that, in accordance with the request of the Board of Governors of the American College of Surgeons, Dr. Hugo Ehrenfest, Dr. Noble Sproat Heaney, and Dr. Brooke M. Anspach be nominated to represent the Society as Governors. On motion, seconded and carried this recommendation was adopted.

The Council unanimously recommended to the Society that inasmuch as there was nothing in the Constitution prohibiting the admission of women to Fellowship, according to legal opinion duly obtained, that properly qualified women may be admitted to Fellowship. It was moved, seconded and carried that this recommendation be decided by ballot.

The Society then took a vote on the recommendation of the Council, and the President declared the recommendation carried.

The Council recommended the election as Honorary Fellows:

Dr. A. H. Freeland-Barbour, Edinburgh, Scotland.
Dr. Thomas Watts Eden, London, England.

They having been nominated by the Council for Honorary Fellowship at the last Annual Meeting. It was moved, seconded and carried that the Secretary cast a unanimous ballot for these gentlemen. The Secretary cast the ballot and they were declared duly elected.

Digitized by Google

The Council recommended to the Society for election as Active Fellows:

Dr. DeWitt B. Casler, Baltimore, Md.
Dr. Lilian K. P. Farrar, New York, N. Y.
Dr. Thomas B. Carroll, Pittsburgh, Pa.
Dr. Carey Culbertson, Chicago, Ill.

Each Candidate was balloted for separately and declared duly elected.

The Council announced the nomination of Dr. Wm. Blair Bell, of Liverpool, England, for Honorary Fellowship, to be voted upon next year.

Dr. Fred L. Adair, Minneapolis, Minnesota, then presented the following report of the joint committee of the American Gynecological Society and the American Association for Child Hygiene on Maternal Welfare, in accordance with the action taken by the Society at the last annual meeting.

Report

The Committee considers its proper functions to be:

A. Elaboration of a complete scheme of maternal welfare as ideally developed, emphasizing the most important points for starting the development of such a plan with the idea of educating the public to the necessity of this work and to serve as a basis for governmental activity. The following skeleton plan is presented:

I. Preservation of life and health of the mother.
- (*a*) Decrease in the number of infections following abortion and childbirth.
- (*b*) By providing better trained attendants.
- (*c*) By educating the laity as to the proper preparation and necessity for proper supervision during pregnancy, etc.
- (*d*) Inspection and control of institutions, etc., caring for maternal cases.
- (*e*) Prevention and treatment of venereal disease in association with pregnancy.
- (*f*) Control of toxemias.

II. Increase in the number of fruitful pregnancies by
- (1) Decrease in the amount of sterility.
  - (*a*) By diminution in the number of infections following abortion and childbirth.
  - (*b*) By diminution of venereal disease, especially GC.
- (2) Diminution in the number of abortions by
  - (*a*) Diminution in the number of spontaneous abortions by educating as to proper care when threatening symptoms develop.
  - (*b*) Diminution in the number of induced abortions.
    - (1) Self-induced.
    - (2) Criminal operations.
    - (3) Therapeutic abortions.
      - (*a*) We recommend that hospitals require the written sanction of at least two reputable medical men before permission to perform an abortion is granted.
      - (*b*) We recognize the desirability of making abortions reportable to the health authorities.
- (3) Diminution of the number of premature births and deaths.
  - (*a*) Education and supervision.
  - (*b*) Provision for proper care of premature infants.
  - (*c*) Recognition and treatment of syphilis.

Digitized by Google

(4) Diminution in the number of stillbirths.
  (*a*) Improvement of statistics and methods of reporting stillbirths with causes.
  (*b*) Education of laity and profession.
  (*c*) Provision of better antepartum and intrapartum care.
  (*d*) Better care of syphilitics.
(5) Diminution in the number of neonatal deaths.
  (*a*) Recognition of the importance of these deaths.
  (*b*) Methods of prevention.
  (*c*) Education of the laity and profession.
  (*d*) Provision of better antenatal, intrapartum and postpartum care.
  More careful scientific study of both stillbirths and neonatal deaths, together with causes of abortion, miscarriage and premature birth.

III. Better facilities for the care of the unmarried mother for her own protection and that of her offspring.

B. Definition of the relationship of this work to other health and welfare activities, such as infant and child welfare; venereal disease campaign; antituberculosis; boards of health; Red Cross and nursing activities as well as social agencies; certain eugenic problems.

C. To have some responsible agency of representatives and well qualified men to advise with the governmental agencies on the problems of maternal welfare. This may be enlarged to become a part of a sort of institution or academy of sciences which could well be an advisory body on matters pertaining to public health and welfare.

D. It is particularly important to work out problems of maternal and child welfare in coöperation with the pediatrists by means of a joint committee representative of the leading national societies. We recommend that this joint committee on Maternal Welfare work with one representing the American Pediatric Society, to elaborate maternal and infant welfare programs.

The Sheppard-Towner Bill

The following recommendations are made regarding this bill:

1. The Committee is in thorough accord with the ends which this Bill seeks to attain, namely, the protection of the health of mothers and infants.

2. We endorse the coördination of all health activities under one head. We consider the protection of mother and infants to be a health measure of paramount importance to the individual and to the state.

3. We oppose in principle the control of health measures by non-medical individuals or boards.

4. We believe in the local control of health activities as distinguished from federal. We approve and endorse the idea of propaganda and investigation emanating from the Federal Government.

5. We do not endorse the Sheppard-Towner Bill in its present form because it does not conform to the above principles and because it embodies the questionable plan of subsidizing state health activities.

6. We endorse the project of establishing a National Department of Health.

After reading the report Dr. Adair moved its adoption. Seconded.

Dr. Edward P. Davis.—This subject is of national importance to which reference has been made in these recommendations, namely, the Sheppard-Towner Bill. In the

Digitized by Google

medical press of the country there have appeared articles for and against this bill, and some of us have been investigating its characteristics and know somewhat of it, and there is no question that the object is a worthy one and one which we can fully endorse. As has been brought forward in the report of this committee, there are principles of action which are objectionable to the medical profession, that bureaucracy and politics shall be kept aloof, and I had occasion to communicate to a friend, a woman, in Washington who is exceedingly concerned in the action of the women voters throughout the country, and this woman stated that the women in Washington cannot realize that we must do things here in accordance with the Washington atmosphere, and the Washington atmosphere is the one thing which is foreign and most obnoxious to the American medical profession. It is an atmosphere of bureaucracy and of political wire-pulling, and we are opposed to that in spirit and in principle.

I move that the recommendation of this Committee concerning the Sheppard-Towner Bill be heartily endorsed by the American Gynecological Society, and that such recommendation endorsed be published in the medical press of the country. Seconded.

Dr. J. Wesley Bovée.—I would like to go further and urge that we file our opinion regarding this bill with the respective committees in the Senate and House and with the President of the United States.

Dr. Davis.—I accept the amendment.

The President.—There are two motions before the Society, one to adopt the report, and the other motion by Dr. Davis as amended by Dr. Bovée.

Dr. Davis.—If you will allow me, Mr. President, I would like to introduce a brief resolution which shall cover the ground because we have already accepted the report.

The President.—You are mistaken, the motion has not been put to adopt or accept the report, but you may present your resolution.

Accordingly, Dr. Davis presented the following resolution:

Resolved: That the American Gynecological Society wishes to put itself on record as being entirely opposed to the administration of the eare of maternity and infancy by any branch of the United States Government other than the United States Public Health Service.

Dr. Robert L. Dickinson.—I would like to ask Dr. Bovée if for one reason or another it would not be better to transfer this matter of the care of maternity and infancy to the United States Health Service? Is it not a desirable thing to do?

Dr. Bovée.—Yes, that is clear on the very face of it.

Dr. Davis.—This matter had the hearty endorsement of active women in the United States who have done more in the genuine care of maternity and infancy and child welfare than all the bureaucrats in Washington.

Dr. Kosmak.—In seconding the resolution of Dr. Davis I should like to call attention to the need for an expression of opinion from this Society. It is unfortunate that in the construction of this bill the medical fraternity was not directly called into consideration. When the question was up for the responsibility of the measure it was not satisfactorily answered. I think none of us will object to any possible aid which the Federal government can give toward removing some of the obstetrical difficulties now so prevalent in many parts of our Country, and especially in the rural districts. But those of us who have studied the bill will come to the agreement that its passage will not provide this very much desired feature. I will ask you in casting your own vote on the subject, which I hope will be positive, to read that bill. It puts into the hands of an important part of the government, powers so unlimited that I do not believe they can be matched anywhere in our governmental organization. It puts into the hands of the Children's Bureau the right to allot to the constituent states of the Union, certain sums of money,

Digitized by Google

and if the states do not carry out the desires and wishes of the Children's Bureau, this money will not be allotted. The entire carrying out of the measure of such great importance to us as a profession is in the hands of certain lay persons. While I have every respect for the present head of the Children's Bureau, and she is a woman who must be regarded as having done a great deal, I would call attention to the fact that she is a non-medical person, her training having been largely acquired as the result of association with such bodies as those concerned with prison reform and neither she nor the heads of the Department of Labor are in a position to administer this act for the benefit of those that are most concerned in it. The Children's Bureau of the Department of Labor was intended to care for children in industries, and a wide stretch of the imagination must be required to extend the powers of these people for the carrying out of this important act. If this question is of such great importance to the nation, it seems to me that the carrying out of such a measure should not repose in the hands of minor government officials or minor government bureaus. The statement that the passage of this bill, when it is incorporated in the new welfare measures, if backed by the administration, should be accepted with considerable caution, because it is for the Children's Bureau, and in case such a development comes about, it is not to be incorporated in the United States Public Health Service, but in the Department of Social Welfare, which will be a mistake.

Dr. Frederick J. Taussig.—As a member of the committee who made these recommendations, the resolution of Dr. Davis is in opposition to the recommendations as Dr. Adair read them. Our position would be better understood if we sent out to the public at large a fuller statement rather than the brief one which does not entirely cover our recommendations, such as he proposes. I feel we should, in addition to recommending the transfer of this matter to the United States Public Health Service, express ourselves as favoring a wider range of opportunity than the organization of the United States Public Health Service and include the coöperation of women and the laity in the working out of this problem. Therefore, I think it would be much better to state our position more fully than has been done in the report of the committee than in a general resolution in opposition to the bill.

Dr. Philander A. Harris.—Last year, as soon as I was elected an officer of the New Jersey State Medical Society, I received papers from the Child's Welfare League of New Jersey, and I found myself one of the directors. Letters came to me in which it was stated that I was in favor of the movement. I never acknowledged any of these letters. I did not express my position in relation to the movement either for or against it. Simply because I was an officer of the New Jersey State Medical Society they took the liberty of doing this. They went along for two years sending circulars and letters to me, still I did not acknowledge any of these communications. Finally, I wrote to the President of the Child's Welfare League of New Jersey, and asked by what authority they were using my name as an officer of the New Jersey State Medical Society. After having written them once or twice, they assured me it was an inadvertence. I never did anything except to ask what was done. The Child's Welfare League came to Newark and its representatives wanted to appear before the different societies, hospital people and doctors to present their cause to them, but we did not see the need of this thing in New Jersey as the field was already covered by others and the movement died a natural death.

Dr. Edward P. Davis.—I have no desire to in any way offer anything against the work of this committee. It is my feeling that the report of the committee should be accepted as a whole. I will very gladly accept the report in place of the brief resolution which I have offered. A brief statement would not give our reasons, nor carry the same

Digitized by Google

weight with the public at large that the report of the committee will, and with your permission, I will withdraw my brief resolution, and ask that that part of the report of the committee pertaining to the Sheppard-Towner Bill be separately endorsed, and I move the adoption of that part of the report, and that it be published in the medical press of the country. Seconded.

Dr. Fred L. Adair.—I am glad Dr. Davis has withdrawn his resolution for the reason that we must appreciate it is very important for our own future that we individually and collectively take a vital interest in these social welfare movements that are going on. In doing so we must maintain dignity and poise and assume a position of expert advisors, so to speak, and that we should carefully limit our activities to the consideration of real fundamentals, and not in any way place ourselves in the position of assuming a partisan attitude. That was the objection I had to the resolution presented by Dr. Davis, because there has been an acrimonious discussion and a great deal of feeling in the Children's Bureau and in the United States Public Health Service over this measure, and if we support it in one way or the other we will immediately place ourselves in a partisan position which I think would be a mistake.

The original motion to accept the report, as amended by Drs. Bovée and Davis, was put to a vote and declared carried.

Dr. Bovée presented the report of the Committee on Nominations for officers as follows:

Report of the Committee on Nominations

Your Committee reports the following nominations for officers for the ensuing year:

President—George Gray Ward, Jr., New York.

First Vice-President—Barton Cooke Hirst, Philadelphia.

Second Vice-President—Walter P. Manton, Detroit.

Secretary—Arthur H. Curtis, Chicago.

Treasurer—Brooke M. Anspach, Philadelphia.

Member of the Council for Four Years—Walter W. Chipman, Montreal.

Members of the Council for One Year—Dougal Bissell, New York; Fred L. Adair, Minneapolis.

The Candidates were then balloted for and unanimously elected.

The Secretary announced that the next Annual Meeting will be held in Washington, D. C., as the triennial meeting of the Congress of American Physicians and Surgeons, of which the Society is a component part, will be held there. The dates of the meeting are May 1, 2 and 3, 1922.

Dr. Dickinson stated that he had been asked to present to the Society the following suggestion from the American Pediatric Society.

Dr. L. Emmet Holt asked for the appointment of a committee of two on conference to meet with like committees from the Pediatric and other societies to consider the question of their meeting every third year in Washington. These committees are to discuss the question whether we can do better than to meet in Washington every third year. He moved that such a committee be appointed by the chair for conference only. Seconded and carried. The President appointed on this committee Dr. J. Wesley Bovée, as Chairman, and Dr. Robert L. Dickinson.

On motion seconded and carried the meeting adjourned.

Evening Session. The Society reconvened at 9 P.M. and was called to order by the President.

11. "Some Considerations of Unsolved Problems in Gynecology and Obstetrics," by Dr. William Blair Bell, Liverpool, England (by invitation).

Digitized by Google

The paper was discussed by Drs. Studdiford, Schumann, E. P. Davis, Brettauer, and in closing by the essayist.

12. "Development of the Hymen," by Dr. Frederick J. Taussig, St. Louis, Missouri, which was discussed by Dr. Blair Bell and in closing by the essayist.

13. "Perforating Hemorrhagic (Chocolate) Cysts of the Ovary," by Dr. John A. Sampson, Albany, New York, which was discussed by Drs. Smith, Heaney, Richardson, Pomeroy, Hutchins, Miller, Dickinson, Culbertson, Chipman, and in closing by the essayist.

14. "The Pathology and Bacteriology of Fallopian Tubes Removed at Operation," by Dr. Arthur H. Curtis, Chicago, Illinois.

On motion, the Society adjourned until 9 A.M. Saturday, June 4.

THIRD DAY, *Saturday, June* 4, 1921

Morning Session. The Society met at 9 A.M. and was called to order by the President.

15. "Hemorrhage from the Non-pregnant Uterus in the Absence of a Neoplasm," by Dr. William A. Scott, Toronto, Canada (by invitation), which was discussed by Drs. Sampson, Stone, Culbertson, and in closing by the essayist.

16. "Ovulation and Menstruation as Postoperative Considerations," by Dr. Thomas J. Watkins, Chicago, Illinois.

17. "Radical Conservatism in the Operative Treatment of Chronic Adnexal Disease," by Dr. Frederick C. Holden, New York City.

18. "The Disposition of the Uterus following Salpingectomy where it is Desirable to Preserve Menstruation," by Dr. Carey Culbertson, Chicago, Illinois (by invitation.)

These three papers were then discussed together by Drs. Graves, Richardson, Blair Bell, Curtis, Norris, Polak, and Brettauer, after which the discussion was closed by the essayists.

19. "Concerning Torsion of the Uterine Adnexa Occurring Before Puberty, together with a Consideration of Torsion of Normal Uterine Adnexa," by Dr. Richard R. Smith, and Dr. William J. Butler, Grand Rapids, Michigan (by invitation).

This paper was discussed by Drs. Anspach, Ehrenfest, Vineberg and Norris.

20. "Torsion of the Cecum, with Review of the Literature and Report of a Case," by Dr. Sidney A. Chalfant, Pittsburgh, Pennsylvania. Discussed by Dr. Schumann.

21. "The Treatment of Vulval and Vaginal Cancers by Means of Filtrated and Unfiltrated Radium Emanations," by Dr. Harold C. Bailey and Dr. Halsey J. Bagg, New York (by invitation).

The discussion was opened by Dr. Taussig, and continued by Drs. Ward, Keene, and in closing by Dr. Bailey.

SYMPOSIUM ON THE TREATMENT OF DISEASES OF THE CERVIX

22. "The Cure of Cervical Endometritis with Cystic Degeneration by the Aid of Multiple Scarification," by Dr. Henry T. Byford, Chicago, Illinois.

23. "Non-operative Treatment of the Cervix," by Dr. Robert L. Dickinson, New York.

24. "End Results of Amputation of the Cervix and Trachelorrhaphy," by Dr. Reginald M. Rawls, New York City.

These three papers were discussed together by Drs. Curtis, Newman, and Watkins, after which the discussion was closed by the essayists.

Digitized by Google

The President called attention to the success of the scientific exhibit provided this year and said he would entertain a motion to extend a vote of thanks to Dr. Taussig.

Accordingly, Dr. Richard R. Smith moved that a vote of thanks be extended to Dr. Taussig for the splendid work and the manner in which the exhibit had been conducted. Seconded by Dr. Newman and carried.

Just before adjourning President Chipman said: "Just a word of thanks from your President. Due to your hearty coöperation, his duties have been very light, and with this word of thanks the Society stands adjourned."

GEORGE GRAY WARD, JR.,
Secretary.

Digitized by Google

CONSTITUTION

I. This Society shall be known as the AMERICAN GYNECOLOGICAL SOCIETY.

II. The object of this Society shall be the promotion of knowledge in all that relates to the Diseases of Women, to Obstetrics, and to Abdominal Surgery.

FELLOWS

III. The Fellows of this Society shall consist of Fellows and Honorary Fellows.

The Fellows shall not exceed one hundred in number.

The Honorary Fellows shall not exceed ten American (exclusive of those who have been Active Fellows of the Society) and twenty-five foreign.

"Candidates for Active Fellowship shall be graduates of medicine of at least ten (10) years' standing and shall be proposed to the Council by two Fellows *only*, who are not members of the Council, at least two months before the first day of the meeting, each nomination being accompanied by a list of the principal publications of the candidate and of the official positions which he holds. On nomination of the Council, each candidate shall be separately balloted for at the annual meeting. A two-thirds affirmative vote of all the Fellows present shall constitute an election, at least fifteen Fellows being present.

"A list of all the candidates, accompanied by the names of their proposers, their official positions, and their principal publications, shall be sent to every Fellow with the notification of the annual meeting."

HONORARY FELLOWS

IV. The power of nominating Honorary Fellows shall be vested in the Council.

No Honorary Fellow shall be voted on at the same Annual Meeting at which his name is recommended by the Council; but at the next succeeding Annual Meeting, except in the case of Active Fellows of the Society being transferred to the Honorary List.

The election shall take place in the same manner as that of ordinary Fellows.

They shall enjoy all the privileges of other Fellows, but shall not be required to pay any fee, or be allowed to hold any office or to cast any vote.

Any member of this Society at the end of twenty-five years' active service in the Society, or at any time thereafter, at his own request, shall be placed on the roll of Honorary Fellows, and shall be so classified in the next volume of TRANSACTIONS, provided the request be made during the fiscal year for which the annual dues have been paid by that member.

OFFICERS

V. The officers of the Society shall be a President, two Vice-Presidents, a Secretary, and a Treasurer, and two other Fellows, all to be elected annually, who, with four other Fellows, one to be elected each year for a term of four years, shall constitute the Council of the Society.

Digitized by Google

All officers shall be nominated and elected in accordance with the By-laws.

The officers shall enter upon their duties immediately before the adjournment of the meeting at which they were elected, and shall hold office for one year.

Any vacancy occurring between the annual meetings shall be filled temporarily by the action of the Council.

All officers shall be eligible for reëlection.

ANNUAL MEETING

VI. The annual meeting of the Society shall be held regularly at a date to be determined by the Council, and shall continue for three days, unless otherwise ordered by vote of the Society at any executive session. The sole management of the annual meetings shall be under the control of the Council subject to any action of the Society at the preceding annual meeting.

AMENDMENTS

VII. This Constitution may be amended by a two-thirds vote of all the Fellows present at an annual meeting, provided that notice of the proposed amendment has been given in writing at the annual meeting next preceding, and that the same has been printed in the notification of the meeting at which the vote is to be taken.

BY-LAWS

PRESIDENT AND VICE-PRESIDENTS

I. The President and Vice-Presidents shall discharge the duties belonging to their respective offices. The President shall be *ex officio* chairman of the Council.

SECRETARY

II. The Secretary shall attend and keep a record of all the meetings of the Society and of the Council, of which latter he shall be *ex officio* clerk, and when not in session shall perform its business by correspondence.

At each annual meeting he shall announce the names of all who have ceased to be Fellows since the last report.

He shall superintend the publication of the TRANSACTIONS, under the direction of the Council.

He shall notify candidates of their election to Fellowship.

He shall send notifications of the annual meetings and of the meetings of the Council.

TREASURER

III. The Treasurer shall receive all moneys due and pay all debts. He shall render an account thereof at the annual meeting, when an Auditing Committee shall be appointed to report.

Digitized by Google

COUNCIL

IV. The Council shall meet as often as the interests of the Society may require. Five members shall constitute a quorum.

It shall have the management of the affairs of the Society, subject to the action of the Society at its annual meetings.

It shall arrange the order for the reading of papers at the annual meetings.

It shall not have power to make the Society liable for any debts exceeding in total one hundred dollars in the course of any one year, unless specially authorized by a vote of the Society.

It shall have the entire control of the publications of the Society, with the power to reject such papers or discussions as it deems best.

The President, or any three members, may call a meeting, notice of which shall be transmitted to every member two weeks previous to the meeting.

The Council shall determine questions by vote, or—if demanded—by ballot, the President having a casting vote.

The Council shall constitute a Board of Trial for all offences against the Constitution and By-laws, or for conduct unbecoming an honorable physician, and shall have the sole power of moving the expulsion of any Fellow.

NOMINATION AND ELECTION OF OFFICERS

V. Nominations of officers shall be made by a committee consisting of the five ex-Presidents who have last served as Presidents and of three Active Fellows appointed by the President on the morning of the first day of the meeting. The ex-Presidents shall report their presence on the morning of the first day to the Secretary.

This committee shall meet on the first day of the Annual Meeting and shall nominate candidates for the various elective offices.

In case of a tie vote in the nominating committee for officers, the acting President of the annual meeting shall be empowered to cast the deciding vote.

The nominations shall be reported and posted on or before the morning of the second day of the meeting.

Any member of the Society shall have the privilege of nominating candidates at the business meeting of the Society.

The Fellows nominated as officers shall be elected by ballot.

ORDER OF BUSINESS

VI. The Order of Business at the annual meetings of the Society shall be as follows:

I. General meetings at 10 A.M. each day.
   1. Reports of the Committees.
   2. Reading of Papers and Discussion of the same.

II. The Business Meeting, at which only Fellows of the Society shall be present, shall be held on the second day of the session, at an hour determined by the Council and announced on the program of the meeting. The Secretary's Record shall then be read; the Treasurer's accounts be submitted; the reports of committees or other than scientific subjects be received; and all miscellaneous business be transacted.

Digitized by Google

PAPERS, ETC.

VII. The titles of all papers to be read at any annual meeting shall be forwarded to the Secretary not later than *two weeks* before the first day of the meeting.

No paper shall be read before the Society which has already been printed or has been read before another body.

All papers that may be read before the Society, and accepted for publication, shall become the property of the Society, and their publication shall be under the control of the Council. Such papers may be published in full in medical journals, provided that they are also printed in the TRANSACTIONS.

QUORUM

VIII. A quorum for business purposes shall be fifteen Fellows.

DECORUM

IX. No remarks reflecting upon the personal or professional character of any Fellow shall be in order at the annual meetings, except when introduced by the Council.

ASSESSMENTS

X. Every Fellow shall pay in advance the sum of twenty dollars annually.

Any Fellow whose subscription shall be more than nine months in arrears shall be reminded of the fact by the Treasurer in writing; in event of payment not being then made, he may, on vote of the Council, be dropped from the Society.

Each Fellow shall pay on admission an initiation fee of twenty-five dollars.

ATTENDANCE

XI. Any Fellow who shall neither attend nor present a paper for three successive years shall, unless he offers on excuse satisfactory to the Society, he dropped from Fellowship.

AMENDMENTS

XII. Any of these By-laws may be amended, repealed, or suspended by a two-thirds vote of the Fellows present at any meeting. *Provided,* Previous notice in writing has been given at the annual meeting immediately preceding the one at which the vote is to be taken.

Digitized by Google

MAY 2 1929
LIBRARY

ADDRESS OF THE PRESIDENT

AMERICAN GYNECOLOGY

An Appreciation

By W. W. Chipman, M.D.
Montreal, Quebec

FORTY-FIVE years ago this Society was formed, and Fordyce Barker was the first occupant of this Chair. At the Inaugural Meeting Thomas Addis Emmet read the first paper; and Robert Barnes of London, an Honorary Fellow, was a distinguished guest.

Of the thirty-nine founders, twenty-eight were present, and there were three guests from Canada,—Trenholme of Montreal, Hodder of Toronto, and Rosebrugh of Hamilton.

The president's address closed with these words:—"Let me express the hope that this Society may command the approval of the highest and most cultivated judgment of the scientific world, and not incur the reproach which Job in his bitterness uttered, 'Ye are all physicians of no value.' "

So, in that memorable year in your country's history, that hundredth year of your national life, this Society was born. And as a Society it has lived, and lived to a full measure of its gift. On its Fellowship Roll are to be found the great national and international names of its time, the builders everywhere; men who have obeyed to the last behest the terms of the Constitution:—"to promote knowledge in all that relates to the Diseases of Women and to Obstetrics." At no time and from no man has this Society incurred the odium of Job's reproach.

Among these names there are seven from the Dominion of Canada, seven names that bear witness to a generous recognition. And by a very gracious mandate a Canadian now sits in this Chair, and the McDowell gavel, for the first time in its history, is in the keeping of a neighbor.

Gentlemen of this Society, may I first thank you for this great honor. I thank you on my own behalf, on behalf of McGill University, and the country which I represent.

My first duty is the sad one of recalling to your minds the deaths of the Fellows during the year.

Five of our Honorary Fellows have been gathered to their fathers:—Benjamin F. Baer, on the eleventh day of last September; John C. Reeve, four days later; Matthew D. Mann on March 3rd of the pres-

Digitized by Google

ent year; Joseph Taber Johnson, on the fifteenth day of the same month; Bache McE. Emmet on May 30th; only four days ago.

These men had all passed the limit set by the Psalmist, and they died, full of honors, as full of years. This Society owes much, not only to their professional attainments, but also to their character and work.

Benjamin R. Schenck, of Detroit, died on June 30th, a month after our last meeting. For nine years he had been an Active Fellow of this Society. His untimely death, at the early age of forty-eight, cut short at noonday the abundant promise of his life's work.

I have chosen as the subject of my address "American Gynecology," and I have called it "An Appreciation." In the truest sense it is an appreciation, for it is an attempt to portray in their proper order of time and place, the large and signal contributions which America has made to this great specialty. This picture will be very broadly drawn, at somewhat of the friendly distance between Canada and the United States, and with the freedom of a neighborly perspective.

I shall include, of course, obstetrics; for gynecology and obstetrics are not only linked together in this Society, but they are copartners from the very nature of the business. Obstetrics has been, from the beginning; and shall continue, I take it, to the end. If it is important to be in the world at all, the matter and the manner of our entrance are a first consideration. With this universal, this world-immigration, gynecology must always be concerned, for it maintains the health and repair of this birth-entrance. Born as she was in the early days of the nineteenth century, gynecology is no longer "rocked in the obstetric cradle, sucking the withered ancestral finger," but has already reached the stature of a full womanhood. "A daughter still in her mother's house, she is mistress in her own" in Kipling's paraphrase expresses best the relationship that should exist between these two subjects.

Thucydides said of the ancient Greeks that they "possessed the power of thinking before they acted, and of acting too"; and it is just the power of thinking and of acting that has set its seal upon this later Magna Graecia,—our own America. This is our large inheritance from the modern Greek, the Anglo-Saxon race; it explains indeed our own existence, and why we are gathered here today, near that famous Colonial city of this larger Agrigentum.

I shall not urge again the parallel that is so often drawn between Greece with her Mediterranean Colonies, and Britain, with what Sir William Osler called "her greater Britain." This analogy that makes our first Atlantic sea-board the Sicily of the Greeks is sufficiently exact, for in that Colonial period this great country was born, and received its birthright, the gift of thought and action of the English race. The Pilgrim Fathers and the Virginia Company changed their sky, it is true,

Digitized by Google

but they changed neither their character nor their characteristics. They brought with them their own race qualities, a courage, a practical sense, an energy in work and, above all, a love of freedom. And they stamped these as a seal upon us, a lasting impress; for through chance and change we are, and we always will be, an English-speaking and an English-thinking race.

And the New World has but strengthened and accentuated these racial characteristics. Assuredly there was a large house to put in order and abundant need of energy, originality, and self-reliance. And so, from the beginning, and through necessity of inheritance and environment, these have come to be the essential quality of our national genius.

Let us now see what all this has done for the growth and development of American medicine, and particularly as it pertains to our own specialty. As we shall learn, it is a remarkable story and, along certain lines, a wondrous achievement. It is a record of but three centuries, for only three hundred years ago Giles Firman, Samuel Fuller, and John Winthrop practiced medicine in Massachusetts; while Lawrence Bohun and John Pott were the first physicians in Virginia. They not only practiced medicine, but they took an active share in civil life; or, like the apostle, Luke, they preached the gospel, the "angelical conjunction" of Cotton Mather. Giles Firman was our first medical teacher, as usual, underpaid; for, later on, he took orders, finding Physic "but a meane help."

These men and their successors were our first emigrant physicians, men of sterling worth, "and of constant if not warm affections." They practiced the medicine of their time, William Harvey had just discovered the circulation of the blood, and obstetrics was the concern only of the friendly midwife.

These emigrant physicians were chiefly from Great Britain and, as time went on, they trained their sons as their "apprentices," and sent them back for their degrees to Edinburgh and London.

A wonderful band of men, even from the beginning, were these native-born apprentices! For it was they who, in due time, founded our medical schools, and really created American medicine. Of such were John Morgan, Benjamin Rush, William Shippen, Jr., Samuel Bard, Caspar Wistar, Philip Syng Physick, John Warren, and James Lloyd. The very names are enough to recall their greatness. We read of William Shippen, Jr., that he was the first professor of obstetrics in our earliest medical school of Pennsylvania, and that he taught also anatomy and surgery there. "In providing a convenient lodging, under the care of an honest, sober matron, for poor lying-in women, he established the first Maternity Hospital." Dr. Samuel Bard, Professor of Physic, in King's College, afterwards Columbia, wrote our first textbook on obstetrics; and James Lloyd, an eminent surgeon,

Digitized by Google

using ligatures instead of the searing cautery, was the first in Massachusetts to devote himself wholly to this subject. Benjamin Rush is justly named the American Sydenham; and Philip Syng Physick, who introduced the absorbable ligature, is called rightly the Father of American Surgery.

These were great men, and they lived in an auspicious time, for the revival of medicine in England, in the 18th century, was at its height. They all had worked and studied with John Hunter, the greatest scientist since the time of Aristotle; the one, be it remembered, a Greek, and the son of the Stagira physician, twenty centuries before, and the other a Scot, the son of the Calderwood laird. They had studied also with the great brother, William Hunter, the founder of scientific obstetrics; with William Smellie, his teacher, with Cheselden, and Pott; they knew as friends and teachers Heberden, John Fothergill, Lettsom, and Thomas Dover. Seven of them were graduates of the University of Edinburgh, where they sat under the Monroes, Cullen, and John Bell. From these men they had learned, by precept and example, they had gathered from them wisdom and experience, and lifelong friendships were formed here which even the War of the Revolution could not sever or destroy.

And so at this time and in this way were laid the foundations in America of medicine, surgery, and obstetrics. Morgan, Shippen, Physick, and Rush were in a manner the great prophets, the forerunners to prepare the way for the illustrious achievements that were soon to follow.

These achievements embrace the brilliant history of American surgery, especially in the domain of the pelvis and the abdomen; and these we owe largely to the founders of operative gynecology, McDowell and Sims.

Ovariotomy it was that made possible all abdominal surgery, and so now let us trace shortly the origin of this idea and its achievement.

The famous story runs that Ephraim McDowell was born in Virginia, March 11, 1771. In 1793, the year of John Hunter's death, he went to Edinburgh, and sat for a year under John Bell, through whose eloquent teaching he was early impressed with the hopeless state of women afflicted with ovarian disease. He did not take his degree, but in the following year returned to the village of Danville, Kentucky, bringing with him, no doubt, the teaching of the time in respect of "Ovarian Hydatids."

This teaching may be summarized as follows. William Hunter, forty years before, had said, "I am of opinion an excision can hardly be attempted, and the trocar is the only palliative;" while John Hunter in characteristic phrase, pronounced that, "if taken in their incipient stage 'hydatids of the ovary' might be taken out. There is no reason why women should not bear spaying as well as other animals."

Digitized by Google

John Bell's teaching stated, "I hope success may attend this operation!" This, if you like, was the birth of the idea, and this idea it remained for McDowell to carry into execution. And so, in Danville, on the thirteenth day of December, 1809, this great operation was first executed. "I am but an instrument in Thy hands," was McDowell's prayer on that December morning, and an efficient instrument he proved himself to be. So was given to the world an operation, the value and far-reaching effect of which can never be overestimated.

By this operation the gates were set ajar to the opening of a new surgical life. But these gates were slow to open, and we remember with pride today the names of Nathan Smith, David Rogers, the brothers Atlee, Edmund Peaslee, Burnham, Kimball, and Dunlap. It needed courage in those preanesthetic days, for the operation was condemned by the profession as being "cruel, barbarous, and unjustifiable," while among the laity, the operator was designated as "a butcher, a murderer, or as a cross between the two." In forty years but thirty-six operations had been performed at the price of fifteen lives; and we can scarcely wonder that but eighteen surgeons had essayed the undertaking. The brothers Atlee will always stand among our foremost surgeons; John was the older, and the pioneer; but Washington L. the more distinguished. The latter made the record of his time, of 387 operations for "ovarian dropsy." Peaslee came later with his improved technic, and the larger number of recoveries; he was the first to use the normal salt solution, or "artificial serum," as he called it; and, above all, he was an excellent exponent. His work on "Ovarian Tumors," published in 1872, embraced the knowledge of the time, and made him and his country famous. In this classic, the names of Charles Clay of Manchester, who gave us the word ovariotomy, and Spencer Wells of London are generously remembered; indeed, the latter is named in the dedication of the book, "the greatest of ovariotomists."

The first step is the most important, even in major surgery, and there now follow but successive steps. Even the surgeon of today may mistake a soft uterine "fibroid" for a firm ovarian cyst, and it matters little to the patient as regards her safety. But how different the case in 1853 when Walter Burnham of Lowell, instead of an ovarian cyst delivered through his incision an enlarged uterus with its fibroid! What was worse, it could not be replaced; and he was compelled to amputate where he could, this courageous, if reluctant, pioneer. But the honor of the first case, deliberately undertaken, fell to his fellow-townsman, Gilman Kimball.

So was launched the hysterectomy; and, one by one, the increasing difficulties, reaping where ovariotomy had sown, were successfully undertaken. It was all largely the work of the same hands, for we find here Kimball, Burnham, the two Atlees, Peaslee, and Thomas. At

Digitized by Google

first the pediculated tumor only was removed,—a myomectomy; and, in selected cases, for greater safety, the vaginal route was chosen. The younger Atlee, in a Prize Essay, awarded by the American Medical Association, described, in 1853, a vaginal myomectomy, which he began on the eighth of May, and continued at different times, removing the tumor piecemeal,—our first morcellement. He regrets the death of the patient, from pneumonia, in July.

But from the first, the abdominal route was usually preferred.

And now, to these courageous pioneers and their long-suffering patients, there came as a veritable gift from heaven, the general use of Morton's ether anesthesia. Discovered seven years before, the happy word itself is the gift of Oliver Wendell Holmes and Weir Mitchell poetically defines its slumber as "the death of pain."

The names of Marcy, Emmet, Jones, Eastman, Stimson, Byford, Baer, Pryor, and Kelly must always be remembered in the evolution of hysterectomy. One and all, they gave important contributions to make it the perfect operation that it is today.

And at first it must have required a great determination, for we learn from Kimball, in 1853, that in a first eleven hysterectomies, there were but six recoveries. And in this development we do not forget the work in Germany of Gustav Simon, Hegar, Billroth, and Schroeder; and in France, that of Koeberle, Velpeau, and Pean. It was of Velpeau, you remember, that the Breakfast-Table Autocrat said, "a good sound head over a pair of wooden shoes is better than a wooden head over feet in calfskin;" while Pean's name will remain as the inventor of the "artery forceps." But the greatest credit of this operation belongs in all truth to America; and, in recognition of this, Thomas Keith, in dedicating his Monograph on Hysterectomy to Skene of Brooklyn, said, "I offer you something that is not mine, but is of American origin * * * for the first case of uterine fibroid diagnosed before operation, was removed by my old friend, Dr. Kimball."

The gates of abdominal surgery were by this time thrown widely open.

And now let us consider vaginal plastic surgery, a second great achievement.

Emerson has said, "when Nature has work to do, she creates a genius to do it." Certainly Nature did not fail us here, for she gave us Marion Sims.

Until this time, our specialty had barely lived through a struggling adolescence, for while Recamier, in 1801, by the use of his speculum, his sound, and his curette, had at least imparted to it accurate observation; and while, later, Sir James Simpson and Huguier had added substance and stature to its growth; it only came of age with Marion Sims. It remained for him to definitely establish it.

It was in 1855 that the Woman's Hospital, New York, was opened

Digitized by Google

by this Alabama surgeon. This was the first special hospital for women, and the scope of gynecology at the time may be inferred from the speeches of the opposition. Dr. Meredith Reese, a prominent physician, contended that anyone could apply nitrate of silver through a cylindrical speculum; that an astringent injection would cure a leucorrhea; and that there was little difficulty in fitting a Physick globe pessary for a prolapse. He but voiced the recognized limitations, and where was the need of a special hospital!

It remained for Marion Sims to change all this. His preparation had been entirely original and self-taught, in a small hospital of his own in Alabama. The world knows the accident of the pewter spoon as a hardware speculum, his consequent success with bladder fistulæ, and the indifferent health which sent him to New York. "I had no influence and no friends; I said to myself, 'I am a lost man unless I get some one to create a place where I can show the world what I am capable of doing.'" To its lasting credit, New York gave him the place, it gave him a hospital, with Sister Margaret and Thomas Emmet.

To the treatment of these fistulæ, Sims brought in addition to his native genius, three special things: (1) the duck-bill speculum; (2) the funnel form of denudation; and (3) the use of silver wire as sutures. And with these he changed the whole picture from a previous succession of dismal failures to nearly a uniform success.

His principles and methods were speedily adopted, not only in America, but throughout the world. Even on his first visit to Europe, in 1861, his reputation had preceded him, and his advice and skill were everywhere invoked. Honors met him at every turn, and for a time he cared for the late Empress Eugenie at Saint-Cloud. His first book, "Clinical Notes on Uterine Surgery," is really a Genesis, for it distinguishes him at once as the founder of our specialty. But specialist as he was he was also a great generalist, for as an army surgeon he served with distinction in the Franco-Prussian War, embodying his experiences in a second great contribution, "The Careful Invasion of the Peritoneal Cavity for * * * All Intra-peritoneal Conditions." His was the greatest reputation ever achieved by an American surgeon. His statue in bronze stands in Bryant Park, New York, erected by his "Professional Friends, Loving Patients, and Many Admirers throughout the World."

Gynecology stands debtor for all time to Marion Sims.

His work, so admirably begun, was ably carried on and further developed by Emmet, Nathan Bozeman (also of Alabama), by Ferguson, E. C. Dudley, Goodell, and Storer. Emmet was undoubtedly the greatest of these. In addition to his abdominal work, he devised an excellent plastic operation for cystocele, rectocele, and complete perineal tear; while his name, alongside of Schroeder's will remain in our literature for the repair of cervical laceration.

Digitized by Google

These, then, were the two great paths—the one first travelled by McDowell and the other by Marion Sims—along which our special surgery has developed. These two paths found their junction in the work of Emmet, Gaillard Thomas, Charles P. Noble, and Howard Kelly, men whose work marks the first milestone on the great highway.

The history of obstetrics in America will always be associated with the name of Oliver Wendell Holmes. We read that he practiced medicine but a few years, and enjoyed only a fair practice, and yet he was the first to recognize the contagious nature of puerperal fever. In a paper, "On the Contagiousness of Puerperal Fever," published in 1843, when he was thirty-four, he showed that this "contagium" was carried from one patient to another. He re-asserted this belief in a second paper, "Puerperal Fever as a Private Pestilence," and so pointed the direction of the way; the way of Semmelweiss, in 1847, who declared that the hands carried particles of "decomposed animal matter" into the puerperal wound; and the way of Pasteur, the famous Dean at Lille, who, ten years later, established his famous formula of fermentation, and showed that "a virus might consist of microscopic beings." This was the way that led to Joseph Lister, in 1867; for Listerism, it will always be conceded, was the most important application of Pasteur's work.

Before this time the history of obstetrics in America is the commonplace story of its academic and clinical establishment,—its gradual emancipation from the hands of the midwives. It was the old world wide struggle of the obstetrician against prejudice, false modesty, and tradition.

In France, you remember, as early as the 17th century, Jules Clement had been called to attend in her confinement, La Valliere, mistress of the Grand Monarque; and the title "Accoucheur" is bequeathed to us for his services; while it was William Hunter in England who was the first man to attend at such a time one of England's queens. In America, as late as 1840, Samuel Gregory of Boston is still found inveighing strongly against the "danger and the immorality" of employing men in midwifery.

The men engaged on this emancipation were, from the beginning, the writers and the teachers of the subject; William Shippen, Samuel Bard, Thomas James, Walter Channing, William Potts Dewees, J. W. Francis, C. D. Meigs, and H. L. Hodge. Dewees was an able writer, and the strongest clinician of his time; and we are told that so popular was he in this emancipation of his subject, that the ladies were accustomed to delay their confinements when he was out of town. Hodge gave us his famous pessary, rivalled only by that of Albert Smith; and he published in 1864 his excellent work "The Principles and Practice of Obstetrics." He and Meigs were eminent clinicians and great teachers; yet they were both bitterly opposed to the contagion theory of Holmes,

Digitized by Google

and they denied the use of ether during labor as "it made the patient drunk, and no self-respecting woman would place herself under such an influence." Ether in parturition was first used by Sir James Simpson in 1847, and later in the same year by Keep and Channing of Boston.

As early as 1807 John Stearns had given us the important contribution to obstetrical therapeutics, "The Medicinal Use of Ergot."

While the first cesarean section in America was performed by John Lambert at Newton, Ohio, in 1827, such operations were few, sporadic, and undertaken *in extremis*. The first elective case was performed by Lusk only in 1887, five years after the appearance of Saenger's monograph. Gaillard Thomas, in 1870, executed for the first time in America a laparoelytrotomy, the sound surgical principles of which have been lately vindicated by the various forms of extraperitoneal section. The epoch-making observations of Emil Noeggerath, "Latent Gonorrhea in Women," were published in 1872, five years before Neisser identified the organism.

True it is, and natural enough, that obstetrics had scarcely kept pace with her brilliant surgical offspring. Even the voice of Oliver Wendell Holmes was for long the voice of one crying in the wilderness, and it remained for Tarnier to first employ Lister's carbolic solution in obstetrics.

As we have seen, Lister published his first report in 1867, but it was more than a decade of years before his great principles were generally accepted. For a time he was certainly a prophet without honor in his own country. James Chadwick tells us that he saw Lister operate in 1873, and that "swayed by the scoffings of my preceptors, I failed to grasp the significance of his principles."

Lister's scientific vindication came from Germany, with the work of Robert Koch, in 1876, the natal year of this Society.

With the founding of this Society, obstetricis and gynecology were definitely linked together, the future lay in experienced and skilled hands, and the subsequent story is written in its Transactions.

It is true that the days of the large adventure were over, but the problems of the new inheritance lay everywhere before us.

One by one these problems have been taken up and investigated. Some few have been solved, their solution but discovering a wider world to conquer.

It is interesting to follow here the history of pelvic hematocele; its gradual recognition as an extrauterine gestation through the studies of John S. Parry, Eastman, Joseph Price and Webster. At this time Lawson Tait was in the midst of his vigorous work in Birmingham.

Much of our knowledge of pelvic infection is written here. Battey described his operation in the first volume of the Transactions; and

Digitized by Google

the recognition and surgical treatment of tubal disease was largely the work of the brothers Price, of Johnstone and Dudley. The long and bitter quarrel between pelvic peritonitis and cellulitis was really settled by Gaillard Thomas.

With the decline of the pessary craze the uterus was no longer, in the words of Clifford Allbutt; "impaled on a stem, or perched on a twig." There developed instead the operations for its suspension, the work of Howard Kelly, Gilliam, Simpson, and Webster Baldy. England gave us the Alexander-Adams, and the method of Olshausen came from Germany.

Cesarean section has been variously modified, and its wider indications more clearly defined by Peterson, Davis, Hirst, Newell, and Edgar. The narrower claims of pubiotomy have been measured, and valuable chapters added to the etiology and treatment of the toxemias of pregnancy and puerperal infection.

Important studies have been made in the anatomy of the pelvic floor, noticeably by R. T. Frank; while new and more scientific methods for its repair have been advanced by Babcock, J. Riddle Goffe, Studdiford, and Ward. In this work the flap-splitting methods of Lawson Tait and Hegar have been justly incorporated, and the Wertheim-Watkins' interposition operation has found, in selected cases, a definite place.

Cancer of the uterus has remained an unsolved problem, despite the efforts of Byrne, Emil Ries, Werder, and John G. Clark. Wertheim's results from Vienna roused only vain expectations; and the use of radium is even now undergoing the test of experience.

In 1880, Skene of Brooklyn described the "latent infection" in the suburethral glands, now known by his name; and chief among the other scientific contributions have been those of Whitridge Williams, Cullen, Reynolds, Taussig, Charles Norris, Brettauer, Gellhorn, Ehrenfest, and Sampson.

As we have seen, it is the work of three centuries.

During these three hundred years there have been three great revivals in medicine: The British, the French, and the German. America has partaken largely from them, has assimilated and made her own the grand ideas of Hunter, of Pasteur, and of Virchow; and the great name of Lister must be added to these. During this time America has herself contributed generously, for she has given anesthesia, together with rich gifts of surgical achievement.

Through all this long inheritance she has steadily pursued her practical, individual way, adapting means to ends, and developing the particular measure of her gift.

And now that her great house is fairly put in order, the time is ripe for more leisurely thought, more concentrated study. The signs

Digitized by Google

of the times are made manifest by the Carnegie and Rockefeller Foundations, the establishment of laboratories, with rich scholarships and endowments. Medical education in its widest sense is an urgent question, and the thoughtful address of Dickinson, our last year's President, has already shown us something of the way.

What it all comes to is this, that we have already contributed to medicine large and handsome gifts of practical things; our time has been largely spent in action. For the future we must concern ourselves with special thinking and research. For it is only with a right conjunction of special thought with action, of science with art, that we can become a growing point, the great growing point of the coming century. It is by taking thought that we shall now add to our stature.

Digitized by Google

THE FADS AND FANCIES OF OBSTETRICS. A COMMENT ON THE PSEUDOSCIENTIFIC TREND OF MODERN OBSTETRICS

By Rudolph W. Holmes, M.D.
Chicago, Ill.

IT IS useful, now and then, to look backward, for an occasion may arise when necessity will demand that we shall retrace our steps, or at least that we may measure our progress. Without retrospect we may lose the proportion of things and awake to the fact that we have made no advance, in fact have merely run around a vicious circle. We all know how phenomenal have been the advances in obstetrics in many particulars; untold benefits have come from the introduction of anesthesia and asepsis which have made possible many operative procedures which were the dream of the obstetricians of the past. Under the new regime the indications, at first, were clearly and definitely drawn; as the certitude of the freedom from pain from anesthesia and the proximate eradication of sepsis were realized, indications were placed on a broader basis, until they became so loosely laid down that they had no real justification beyond what the operator determined for himself. It is not far from the fact that obstetrics, today, is in identically the position that oöphorectomy held some twenty-five years ago. The indiscriminate employment of operative intervention in obstetrics has accomplished little in the way of conservation of life of the mother and child; in fact, as I see it, conservation of life is not to be realized by operation beyond the exactness in determining its justification, and its correct use. If figures may be interpreted to mean anything I believe my data prove conclusively that our endeavors during these later years have been misspent: true conservation is to come from intelligent, scientific investigation of the pathology which underlies and is responsible for so much of our disease in the pregnant and the unborn child. A ruthless operative course in all parturient women is not the solution, for many of the troubles which come to women and the baby are directly incident to the hazards of birth and these are augmented by unwise interference.

We all know how wonderful has been the diminution of the mortality rates for women and infants in private practice: however, the safeguards placed about the mother have accomplished more than they have for her offspring. How many of you know that the death rate for women, in hospitals, is as great today as it was a hundred years ago—the decrease being so negligible that one hardly would know it?

Digitized by Google

How many know that in hospitals the fetal death rate is essentially what it was one century ago? These startling findings are the excuse for presenting this paper. It is my purpose to attempt an analysis of the conditions, to give a tentative explanation and to open the trail so that others may pave the way, so that obstetrics may be a scientific specialty, not a makeshift as it is now.

Is it not seemly that we should take cognizance of conditions obtaining, when this country of ours is fourteenth in the list of civilized countries having statistics dealing with the mortality of the new mother? Is it not seemly that we should consider this matter when 8453 obstetric women died, according to mortality statistics, in 1910? To be sure cancer kills 9,857 women, but cancer takes its toll at 58.4 years on the average, while child-bearing takes the young woman in the fullness of life at the age of 29.8 years. Does it imply that neither the public nor medical profession has fully appreciated the benefits of prophylactic medicine? Or is it that scientific pursuit has not yet solved the problem, and we are still groping in the dark!

The masters of the century ending with the beginning of the antiseptic era had developed the art of obstetrics (in contradistinction to the surgery of obstetrics) to a high degree: the skill with which they were able to deliver women in the presence of all sorts and conditions of complications developed a nicety of technic which left little or nothing for the modern authority to improve: in fact very little has been contributed these forty years on the art of obstetrics. The old masters, in spite of the restrictions imposed by the risks of infection, and therefore, lacking an opportunity of developing a technic from practice, were able to conceive the essential principles of the mutilating operations on the mother—which now more euphoneously are denominated obstetric surgery.

The fact that modern maternity hospitals, where is centered the obstetric skill and knowledge of our profession, have been unable to decrease the dangers of birth to mother and child over the figures obtaining the early part of the nineteenth century is *prima facie* evidence that modern obstetric surgery is ineffectual in combating those dangers. Table I has been prepared to demonstrate this contention. The fluctuations in the maternal death rates, before 1880, ranged from 0.44 to 1.28 per cent, and are only variants which would come to any institution from year to year. Since 1910 the rate varied from 0.41 to 1.01 per cent in different institutions. An analysis of the children was not so graphic in view of the fact that some writers, as Moran, combined abortions and stillbirths, others included stillbirths and those dying in the hospital. Still, the figures show how little progress has been made these many years. There are many arguments which might be advanced to show why present hospital statistics are not comparable to

Digitized by Google

TABLE I

MATERNAL AND FETAL MORTALITIES

REFERENCES	PERIOD	TOTAL NO.	MOTHERS DIED	%	ABOR-TIONS	STILL-BORN	%	CHILD DIED	%	DIED 14 DAYS	%	DIED TOTAL	%
Clarke: Collins'	1782	17650								2944	17.		
Mid. p. 514, 1835	1784	8033								a419	5.2		
Ramsbotham: Mur-	22	48996	220	.44				2723	5.5				
phy's Mid., 1862	yrs.												
Hardy & M'Clintock:	1856	6634	65	.92				467	7.03				
ibid., p. 698	1861												
Sinclair and Johnson: ibid.		13748	163	1.18				968	7.04				
LaChapelle: ibid., p. 699.		22243				b130		837	3.7				
								c967	4.3				
Arneth: ibid., p. 700	1847	6527	127	1.9				d244	3.7				
Dublin Lying-	1747	182997	2352	1.28		10184	5.4	6670	3.59			17854	9.6
in: ibid.	1861	e185737											
Körosi: Ashby and Wright:													
Dis. Child. p. 13, 1893	1875	26623								1610	6.05		
Schultze: Winckel	1893	236050				7653	3.2						
Handb. Bd. 2, Tl. 3	1902												
P. 1706.													
Annual Report,	1890	10233	42	.41	417	359	3.65			214	2.18	573	5.8
N. Y. Lying-in, p. 79, 1897	1896	f9816											
Bulletin: ibid., p. 27, June, 1911	1910	g5165	50	.96	226	271	5.4	171	3.4			442	8.8
		f5002											
Ibid., p. 56, March, 1913.	1912	g5606	57	1.01	245	262	4.59	165	2.89			427	7.86
		f5412											
Ibid., Jan. 1917	1915	g6266	50	.8	237	255	4.07	155	2.47			410	6.6
	1916	f6100											
Cragin: Prac. Obs.	1908	10000											
1915, p. 836	1913	f9767			231	499	4.5	389	3.9			838	8.5
Edwards: J. A. M. A.	1907				32	94	2.77			89	2.63	183	5.4
Oct. 16, 1915	1914												
Williams: Ibid., Jan. 9, 1915		10000								705	7.05	705	7.05
Moran: Ibid.,	1876	10533				h716	6.79			623	5.9	981	9.5
Dec. 25, 1915.	1915					h358							
Augustana Hos.	1911	g1964											
Chicago.	1920	i1975	15	.76		57	2.8			82	4.6	139	7.05

ABOVE FIGURES ARE SUGGESTIVE: DOES MODERN LIVING ENHANCE RISKS OF CHILDBIRTH? WHAT INFLUENCE DOES THE ARGUMENT HAVE THAT MORE SERIOUS CASES ARE ADMITTED TO HOSPITALS OVER FORMER PERIODS! THE N. Y. LYING-IN HAS ABOUT 10% OF EMERGENCY WORK. Abortions are excluded in getting percentages of stillbirths and children that died as abortions are as yet not preventable. KEY: a. After ventilation introduced: b. premature and deformed: c. total deaths: d. includes feti dying within 9 days: e. total children includes twins, etc.: f. abortions deducted: g. mothers: h. Moran did not separate abortions from stillbirths: one half taken as rough estimate as stillbirths: i. twins; included. "Children died" may include stillbirths and those dying in the hospital—no explanation thereon given. Williams' figures comprise stillbirths and those dying in 14 days.

Digitized by Google

those of olden times—the main one being that *now* it is customary to send women with complicated labors to an institution which largely, in the former period, were treated at home. Harrar[10] shows this graphically in his report on the deaths in the New York Lying-in. How much is offset by the tendency to treat those complications by surgery rather than by obstetric methods is debatable.

Two complications of pregnancy may be briefly discussed to show how negligible has been the advance in recent methods of treatment. Eclampsia stands out preeminently as a complication which demanded some method of delivery ever since Blundell,[1] in 1834, discussed the advisability of acceleration of delivery, and Carl Braun[9] popularized it. During last twenty years various obstetricians have improvised operative measures which might accomplish the result with a minimal lapse of time. More discussion has been employed on how to empty the uterus in eclampsia than has been expended on all other phases of the problem. The most evident thing about the question is the paucity of evidence adduced which might elucidate the cause, and then develop a rational therapy. Surgery for eclampsia as the essential part of the treatment is clearly and definitely indefensible. If there be anything to Stroganoff's treatment, it shows most positively that eclampsia is a disease, as popularly treated, which carries a dual mortality—that incident to the toxemia and an equal hazard from the surgical intervention. In Table III, I show that in the preantiseptic days the maternal and fetal mortalities were respectively 20.4 and 33.3 per cent: the modern methods exhibited mortalities of 19 and 39.6 per cent: while in cesarean section in the period covered by modern treatment, the deaths were 34.8 and 25.9 per cent, respectively. Our modern conception of the treatment considers many things other than prompt delivery: really, it was not until 1850 that remedial agents were advocated other than blood letting, and purging. Blundell[1] did discuss, as did others, the use of opium, but many years elapsed before sedatives, anesthetics, etc., became established adjuvants to the therapy. It may be said that the older authorities had no real therapy, yet their results were as good, even better, than ours. In other words, no modern therapy has modified the lethal progress of mother and child with the single exception of that of Stroganoff: a comparison between the results of the latter with the much lauded cesarean operation shows that approximately one baby is saved at the expense of nearly four mothers. I believe Peterson did an unwise thing in his cesarean-eclampsia papers when he attempted to show how many babies might be saved by the operation, and not showing how many were destroyed by the disease; there is a great difference. Eclampsia always has been a fulminating, acute malady with a high death rate: the operatve measures so popularized are carried out on bad surgical risks. Anuria,

Digitized by Google

bowel stasis, anhidrosis, with marked cerebrospinal manifestations, characterize the disease and, as a result, women have died from the toxemia and the operation: likewise, the infants succumbed to the intoxication and the hazards of a forced delivery. Newell[2] has given ample evidence of the pernicious influence of the teaching that eclampsia demands major surgery.

Mueller[3] stated that one half of the deaths from placenta previa were due to infection. The mortality of the mother has decreased one half by cleanliness, not from an improvement of technic, or startling innovation in treatment. Obstetric treatment has not affected the fetal mortality whatsoever, though cesarean section has reduced the percentage from 55.5 to 35.6. Again, the section has not diminished the maternal mortality over approved obstetric methods and, comparing the results of the average cesarean mortality with the findings of such experts as Stratz,[4] Welti-Pinard,[5] and Koblanck,[6] who demonstrate the gifts of skill, we still find that the section kills women in order that babies may be born alive. *A priori*, it would seem that a previa should only be handled by surgery when the woman is a good surgical risk, free from possible contamination, at or near term, the baby definitely alive, and some valid contributory necessity such as a minor pelvic deformity. The advocacy of a routine cesarean for all previas will bring upon the public malign results similar to those depicted by Newell for eclampsia.

I think the facts I have outlined for those two great obstetric complications are sufficiently alarming to warrant your attention. If a comprehensive comparative study were extended to cover a multitude of ordinary accidents of childbirth I am sure data would be presented which would still further substantiate the general principles I have deduced, namely, that modern obstetrics has not safeguarded childbearing logically as it should be.

The commonly accepted explanation for the maternal and fetal mortalities as they obtain today is given succinctly in the *Journal of the American Medical Association*.[7] "Two causes are suggested: ignorance on the part of the public of the dangers connected with childbirth and of the need of skilled care and proper hygiene to prevent them, and the difficulty of securing proper obstetric care * * * and the public still regards childbirth as an entirely normal process and a certain number of deaths are unavoidable. This has reacted on the medical profession, producing low fees, so that, with the exception of the city specialist, obstetrics has become the worst paid, although the most difficult and exacting branch of medicine."

No one may refute the correctness of the views here quoted in so far as they go, but many other factors have their determining influence. Ignorance and credulity as regards medical matters are dominating

Digitized by Google

TABLE II

OBSTETRIC RESULTS OF MIDWIVES AND PHYSICIANS OF NEWARK COMPARED*

	MIDWIVES	PHYSICIANS	HOSPITALS	CITY RATE
Proportions Confined	49%	39%	12%	
Puerperal deaths	10	31*		
Puerperal deaths, women having been given antenatal care, No. 586.	.17%			2.02
Children dying under 1 year of age— 2 year period, per cent	7.07%	7.43%	9.74%	9.74
Children dying under 1 mo.— 2 year period, per cent	2.51%	3.82%	5.73%	
Stillbirths in women receiving antenatal care	.68%			4.17%

SPECIAL THERAPEUTIC MEASURES	MOTHERS DIED	STILL-BIRTHS	DIED IN 14 DAYS	TOTAL
Midwifery data brought down.	.17	.68	2.51†	3.19
Routine Version: Cases 1113 (la)	.179	3.7	3.05	6.7
Routine Version: Cases 200 (la)	1.5	9.5	6.5	16.
Routine Dilatation by bags: Cases 200 (lb)	1.	1.	5.	6.

*Levy, Julius: Am. Jour. Obst., Jan. 1918, p. 41.
Routine version: Am. Jour. Obs. and Gyn., Mar., 1921.
Routine version: Ibid.
Routine dilatation by bags: Ibid., Oct., 1920.
†30 days.

characteristics of the lay mind, but just these elements are clay to be moulded by altruistic physicians in educating the public. Patent medicines and spurious medical cults have their success assured by playing upon these weaknesses of the public. The public wants something better: the public may believe now and then death awaits at the door of the confinement room, but it wants that incidental demise to occur elsewhere than in its own home: if the public knew the solution it certainly would have it to ward off the evil. The crux of the problem lies within the education of the profession and there is no need of an endeavor to place the onus upon the ignorant public.

The rise and fall of the efficiency in judgment of the general practitioners in their obstetric work are reflections of the attitude and efficiency of the obstetric teachers: and by teachers I mean not only pedagogic members of college faculties, but also contributors to current medical literature. The former and the latter may be one, but from the fact that one may be a professor in an approved medical school gives added dignity and weight to his utterances, and therefore, will be more dangerous from that fact if his teaching be faulty. With a few possible exceptions, probably the quality of the teaching of our colleges is as defective as Williams[8] found it some years ago. A few maternities have expanded since Williams prepared his paper: largely, they are still inadequately equipped, with insufficient capacity for proper teaching, or for developing the clinic experience of the teachers themselves. What may one expect of the average teaching force other than it will give inadequate and faulty instruction: that its mediocrity in experience and capabilities will be reflected in the

Digitized by Google

mediocrity of thought and attainment and ability on the part of the students faultily trained. Too often teachers do not instill into their students the breath of conservatism, of sound thinking, of deductive reasoning, so later, as physicians, they grasp at the most nonsensical recommendations. We all can recall our student days when the professor who gave spectacular clinics was more popular than he who conducted his clinic without ostentation: in many of our principal colleges the obstetric clinic of the present is too largely the pyrotechnic exhibition which characterized the older surgical arena. An aggregation of complex, unusual problems are presented, leaving scant time for the ordinary run of obstetrics, such as will be indispensable to the student as a practitioner. Certainly a clinic which gives a student 18 major obstetric operations in his two weeks' practical training has misappropriated the student's time. The modern trend in obstetric teaching interferes with a student's perspective: a student who sees an array of heroic surgery out of all proportion to his practical clinic and didactic work, is so befuddled that he naturally conceives that nearly all cases need intervention. Then again, the student's perspicacity may discern that the professor's indications are weak—but later, as a physician, he will do likewise, backed by eminent authority.

The contributions to the literature are the postgraduate instruction of men in active practice. The authors are the bell-wethers of those who read and learn: these writings may be the guides to the thoughtful to a better understanding, and to a more perfect solution of the difficulties which constantly arise in practice or they may be merely the occasions for commercializing the writer, who does not exhibit a celerity of judgment in his recommendations. Unfortunately, too often readers are unable to differentiate between the gold and the dross and as a result any one who will report an operation or a line of treatment, necessary or unnecessary as it may be, for some ordinary or extraordinary indication, will have imitators who pass the bounds of reason. It may be difficult for the average reader to discriminate between fallacy and truth in the writings of a subtle author: for that reason a man of judgment will not rush to print until long, mature experience justifies the exposition of his theme. There have been too many unwise exploitations which were precipitated upon the profession in the hopes, if they proved popular, priority might be claimed. We all recall the fiasco of twilight sleep furor. We all know the dangerous results which came from the thoughtless laudation of the reputed harmless virtues of pituitrin. The pen is reputed to be mightier than the sword, and it surely is more deadly when wielded by the sophisticated writer.

The basic error has crept into the obstetric field that pregnancy and labor are pathologic entities, that childbearing is a disease, a surgical

Digitized by Google

TABLE III

ECLAMPSIA MORTALITIES

REFERENCES	PERIOD	NO. MOTHERS	DIED	%	NO. CHILD	DIED	%
Ramsbotham: Murphy Mid.	1840	43	3	6.9	53	18	33.9
Collins, R.: 1862 p. 698.	1835	30	5	16.6	32	18	56.2
Hardy and M'Clintock: Ibid.	1857	13	3	23.	13	6	46.1
Sinclair and Johnson: Ibid.	1847	63	13	20.6	69	23	33.3
Mme. LaChapelle: Ibid.	1821	8	?	?	8	2	25.
Arneth: Ibid.	1849	13	4	30.7	13	6	46.1
Braun, C.: Gyne., p. 833, 1881.	1878	73	20	26.	73	15	20.5
Totals: Before antiseptic era.		235	48	20.4	261	88	33.3
Modified Expectant Methods							
Dührssen: Eclampsia; Winckel's Handb. d. Geb., ii Tl. 3.		80	30	37.5	80	60	75.
Friedman, B.: Ibid., p. 2411.							
Goedecke: Ibid., p. 2412.		403	69	17.1	403	194	48.
Franz: Ibid., p. 2421.		17	2	11.8	17	5	29.4
Sommer: Ibid., p. 2421.		16	6	37.5	16	10	62.5
Jardine: Ibid., p. 2423.		22	6	27.7	23	13	56.3
Sturmer: Ibid., p. 2423.		43	5	12.2	?	?	
Mangiagalli: Ibid., p. 2423.		18	1	5.5	?	?	
Stroganoff: Ctb. f. Gyn., 1910, p. 756.		400	26	6.6	360	77	21.6
Lichtenstein: Arch. f. Gyn., 1911, p. 183.		400	74	18.5	371	144	38.8
Hammerschlag: Op. Gyn., p. 433.		8	3	39.	?	?	
From R. Peterson, Am. Jour. Obst., 1911, lxiv, p. 1.							
Bumm-Liepman: Ibid.		90	28	31.1			
Esch (1904-5): Ibid.		79	20	28.8			
Esch (1905-6): Ibid.		145	42	28.9			
Glocker: Ibid.		9	3	33.3			
Möhlmann: Ibid.		10	1	10.			
Winter: Ibid.		8	3	37.5			
Zweifel: Ibid.		49	16	32.6			
Totals: Modified expectant cases.		1795	335	19.	1270	503	39.6
Peterson, R.: Am. Jour. Obst., 1911, lxiv, 9.		530	124	23.4	315*	67	21.2
Vaginal Cesarean.					530†	282	53.3
Peterson, R.: Ibid., 1914, lxix, 924.		500	174	34.8	381*	25	6.5
					481†	125.	25.9
Cases before 1908.		198	95	47.9	133*	16	12.
					198†	81	53.3
Cases after 1908, to 1913.		283	73	25.8	248*	9	3.6
					283†	44	15.5

*Results obtained by eliminating children weighing 2000 gm. or those up to eighth month of pregnancy or that were judged to be premature, living or dead: no child was counted which was known to be dead at time of operation.

†We are dealing with a disease having a high mortality, influenced by various treatments, not the dangers of a major operation: i.e., for the sake of comparison it is necessary to add such figures to the infant mortality as will account for the babies not included in Peterson's statistical report.

Maternal mortality has not been ameliorated these one hundred years. Fetal mortality has not been diminished, either. Cesarean section robs the fetus of many of the lethal stresses of forced delivery, therefore Cesarean section saves babies at the expense of the mother.

malady which must be terminated by some spectacular procedure. There is too insistent preachment by those who are defending a reign of terror, of promiscuous operative furor, by the argument that women have so degenerated that childbearing is a phase of pathologic anatomy.

Digitized by Google

These discussions have gone so far that practitioners, supported by spurious authority, are operatively interfering when conditions demand a watchful expectancy, or at most some minor intervention—the culpability lies not with the general practitioners, but their sponsors. And no one is doing so much of this needless operative interference as many of our reputed leaders, and they know not the wreck they have wrought, for they hear only the encomiums on their fallacious representations and their misapplied skill. Those who have stopped, looked, and listened have seen and heard the catastrophies which have accumulated in the wake of the false promulgations. I believe there should be a most emphatic declaration that childbearing is *not* a disease, is a normal physiologic function which may develop pathologic aspects and for that reason all women should have a most careful conscientious prematernal care so they may guard themselves and be protected against possible disaster to themselves and their offspring. The general polemic that labor is a species of the torture of the inquisition has been advanced so frequently that many defend most drastic interferences on the score of saving women this horror—that the dread on the part of women of this frightful agony warrants any and all kinds of expedients to relieve them of the various stages of labor, when, in fact, too often these strictures are merely the shibboleths of those who would operate with little or no provocation. In consequence, we see some who claim the great object is to shorten the first stage by the routine introduction of the bag; another, that it is an obstetric crime to interfere with the delicate mechanism of dilatation, but the moment dilatation is completed, then, the parturient canal must be slashed, and the baby and placenta delivered by high art. Another holds that the baby must be ushered into the world as custom dictates it shall make its mortal exit—feet first; again, we find men who believe the cesarean operation the panacea for all ills and make it a routine procedure. I have been credibly informed that for a woman to be more than six hours in labor brought censure or reproach upon the physician in attendance, in one of the large towns contiguous to Boston. A former student was showing me through a hospital where he was resident: he informed me he was told, as a joke, that the "office hours" was the principal indication for forceps, but when he got on the obstetric service he found it was the plain truth. I have yet to be convinced that the average woman is repressing the reproductive function from the fear of the pangs of labor: the woman who is so loath to assume motherhood on this score probably has such an absence of maternal instinct that her progeny, uncreated, are more happily situated in the *here-to-fore* than made subject to her selfish influence. Those who have studied the situation know full well that sociologic-economic necessity transcends all others in the restriction of families.

Digitized by Google

TABLE IV

TREATMENT OF PLACENTA PREVIA
MORTALITIES COMPARED

OBSTETRIC TREATMENT TABULATED BY HOLMES	MOTHERS NO.	DIED	%	CHILDREN NO.	DIED	%
Ramsbotham*	82	?	?	82	50	60.9
Collins*	11	2	18.1	11	5	45.4
Hardy and M'Clintock*	8	3	37.5	8	3	37.5
Sinclair and Johnson*	24	6	25.	24	13	54.1
Arneth*	9	1	11.1	9	6	66.6
Braun, C.†	37	9	24.3	37	18	48.6
Klein*	11	2	22.2	12	12	100.0
	100	23	23.	183	107	58.4
Read, Wm.: Placenta Previa, 1861, 12 tables.	978	206	21.2	850	447	50.8
††Blacker: all since 1880	22	1	4.5	22	8	36.3
Kouwer	8	3	37.5	8	3	37.5
Ribbius	98	7	7.1	98	39	40.8
Stratz	57	1	1.7	57	36	63.
Fry	14	0	0	14	5	35.7
Galabin	92	15	16.1	92	69	75.
Hautel	123	12	9.7	123	92	74.1
Hirst	28	0	0	28	24	50
Siebert	24	10	16.8	24	8	33.3
Dorman	84	10	11.9	84	38	45.
Welti-Pinard	149	4	2.6	149	34	32.7
Lomer	236	21	8.9	178	105	60
Drejer	49	2	4.09	50	12	23.5
Platzer	46	4	8.7	46	25	53.2
Zedler	16	2	12.5	16	6	37.5
Higgins	75	8	10.6	?	?	
Rotunda Hospital	74	3	4.	?	?	
Murphy	61	2	3.2	?	?	
Klein	138	13	9.4	?	?	
Schauta	234	16	6.8	234	127	54.
Strassmann	231	22	9.5	231	144	61.2
Driessen	125	19	15.2	125	80	64.
Doranth	216	20	9.3	216	152	70.3
Fournier	7	0	0	7	3	43.
Koblanck	467	18	3.8	?	?	
DeLee	30	1	3.3	31	13	41.9
Amadi et Ferri	100	5	5.	100	32	32.
Behm	52	0	0	52	30	60.
Totals.	2756	213	7.4	1985	1075	54.1
Jewett: Am. Jour. Obst.	2010	221	10.9	2020	1159	57.3
Behm, omitted, repeated	40	0		40	31	
	4726	434	9.2	3965	2201	55.5
Abdominal Cesareans.						
††Cases collected by Holmes: also 7 babies	25	5	20.	25	9	36.
died within 14 days.					16	64.
Jewett: Am. J. Obs., p. 943, June, 1909.	95	11	11.5	97	37	34.
Davis, Asa, Am. J. Obs., p. 120, Jan. 1915.	21	2	9.5	21	7	33.3
Davis, E. P., Penn. M. J., p. 292, Jan., 1915.	18	0	0	18	7	37.7
Foulkrod: Am. J. Obs., p. 459, Mar. 1913.	4	1	25.	4	1	25.
Doederlein: Cent. f. Gyn. p. 1383, No. 38, 1913.	146	12	8.9	146	44	30.1
Total Cesareans	309	31	10.	311	111	35.6
Obstetric Treat.	4726	434	9.2	3965	2201	55.5
Preantiseptic Period.	1078	229	21.2	1033	554	53.6

*Murphy: Midwifery, 1862, p. 698, et seq.
†Braun, C.: Gynecology, 1881, p. 561.
††Blacker et seq. to Behm taken from table in "Cesarean Section an Improper Procedure," Jour. Am. Med. Assn., May 20, 1905.

Digitized by Google

In the past, conservative writers arraigned those who did meddlesome midwifery, the vogue of the times being minor transgressions like protracted digital dilatation which accomplished no purpose, titillation of the clitoris for the purpose of exciting pains, or making the hapless woman forget her troubles, pulling on the cord, or too frequent application of the forceps, etc. Meddlesome midwifery has now taken a more serious turn until it comprises all the known methods of necessity, even major surgery, without the vital essence of a valid indication: the favorite rôle being those which will consummate delivery with the minimal expenditure of time. Is it not a parody on modern scientific obstetrics that each advocate of his special form of interference will proclaim results not in consonance with the experience of experts, will declare the simplicity of the procedure is such that all may do it, no untoward effects need be expected, when in our hearts we know their allegations, probably based upon thoughtless enthusiasm, are most egregiously exaggerated? And when these advocates appear before a scientific body, with their specious claims, all laud their skill, and rarely is one courageous enough to combat the irrational and untenable interference.

It was a natural consequence that all obstetric procedures had their indications widened as their relative safety became established. But that any operation, because asepsis makes it reasonably safe and anesthesia keeps the patient quiet during its performance, should be so inordinately broadened in its scope that the suspicion (no candid admission) is evidenced that it is being done for the convenience and conservation of time of the operator, is a travesty on scientific endeavor. I feel that the modern trend of obstetric practice has been to apply surgical manipulation to normality to a degree which is not in consonance with refinement of judgment. What is needed is a reformation in the rules and the development of an obstetric conscience which will permit intervention only when intervention is imperatively needed. Strict indication is one thing, but the widespread use of operative interference with no indication except the whim, or plain obcecation of the attendant, has spelt disaster, has retarded the progress of obstetrics, and has fended off the days of conservation of the expectant mother and her unborn child. It is a reproach on the medical profession that a city like Newark may advertise the fact that it is safer to be delivered by a midwife than by a physician or in a hospital.

CONCLUSIONS

1. In safe conservative hands maternal and fetal mortalities have decreased in private practice.

2. The maternal and fetal death rates, in hospitals, have not shown an appreciable decline in one hundred years.

Digitized by Google

3. The fact that the death rate among the emergency cases (i.e., those sent in by medical attendants) is over ten times that of regular applicants in the New York Lying-in Hospital is a reflection on the preliminary medical training of the profession.

4. Scientific investigation of antenatal pathology which will promote a prophylactic therapy will lower infant mortalities more than the present attempts to do so by routine operative termination of labor.

5. A properly conducted prenatal clinic, combined with conservative conduct of labor is a more certain method for securing declining death rates than promiscuous intervention.

6. Under normal conditions, spontaneous labor, aided by proper analgesia, is the safest way for mother and child. Inordinately applied operative interferences increase the hazards of birth.

7. The authorities who have fostered a peculiar method of routine interference in all parturient women, with their imitators, have retarded the advance in obstetric care, and are part contributors to the high American mortalities incident to childbirth.

8. It is a lamentable thing that properly controlled midwives will have less mortality than those who practice a routine intervention.

9. The proponents of operative cults have produced no evidence to show that their systems are more worthy, less risky, and promise a higher conservation of life than carefully watched spontaneous labor.

10. There are no more reasons why all parturient women should be delivered by operation than that all people should be inflicted with routine enemata or catheterization.

11. A medical fad should be discountenanced: precept and example founded on injudicious enthusiasm lead to many unwise courses.

12. Indications for obstetric operations demand revision: certainly, they should be more clearly drawn and curtailed, rather than extended.

13. A wise conservation in obstetrics will be more productive of ideal results than injudiciously used skill.

14. Obstetric teaching is so deficient in most colleges that there should be a sharp and early improvement: so long as obstetric teaching is defective so long will obstetric results be bad in practice.

15. An obstetric curriculum should be devoted to practical instruction on the manikin, in the class room, and in the clinic; obstetric surgery should be a very small part of the coordinated whole. The proper place of the latter is in postgraduate courses intended for those preparing for the specialty.

REFERENCES

(1) *Blundell*: Obstetrics, 1834, p. 657. (1a.) Ibid., p. 652. (2) Jour. Am. Med. Assn., Feb. 24, 1917. (3) *Mueller, L.*: Placenta Previa, 1877, p. 195, et seq. (4) *Stratz*: Centralbl. f. Gynäk., 1899. (5) Corr. Blatt f. Schweizer Aerzte, 1896, p. 498. (6) *Koblanck*: Encyclopedia f. Geb. u. Gynäk., 1900, p. 189. (7) Jour. Am. Med. Assn., April 28, 1917, p. 1266. (8) Jour. Am. Med. Assn., Jan. 6, 1912. (9) *Braun, C.*: Gynaekologie, 1881, p. 837.

Digitized by Google

FORCED LABOR; ITS STATUS IN OBSTETRIC TEACHING

By John Osborn Polak, M.D.
Brooklyn, New York

FOR the purpose of this discussion we shall consider the comparative status of such procedures as:

1. The induction of premature labor in contracted pelves, with a conjugate vera of 8.5 cm. or more.

2. The induction of labor at estimated term in normal pelves by the introduction of the bag, bougie, or vaginal pack.

3. Procedures for the shortening of the course of the second stage of labor, such as the use of pituitary extract or of routine forceps when the head is below the spines, or on the pelvic floor, and the cervix is fully dilated, with deliberate discission of the outlet soft parts.

4. Measures which entirely eliminate the second stage of labor, as elective internal version, and elective cesarean section, and finally:

5. Hurrying the third stage by the immediate and forcible expression of the placenta, with the first uterine contraction.

It would seem that it is time for us as a Society, composed of the leading obstetricians of this country and Canada, to formulate certain indications and methods of procedures and to agree as to the admitted status of the different forms of intervention.

A large proportion of our Fellows are teachers of obstetrics and gynecology in medical schools and our attitude, which voices as it does our criticism or commendation of a presented procedure, has much to do with moulding the ideas of the profession in the practice of obstetrics.

As teachers we must distinguish between what is safe for the trained specialist to do, and what is safe for us to teach our students to do; for we must all admit that we are not turning out a trained product in obstetrics when we graduate our men from a medical college.

In order to justify our endorsement of such procedures as induction, prophylactic forceps, elective version, elective cesarean, and forced expulsion of the placenta, it must be shown that these procedures have reduced the dangers of childbirth for the child-bearing woman, and that the temporary relief gained from shortening the labor is not gained at the expense of greater trauma, infection, and subsequent invalidism than results from normal labor.

Further than this we must show that the occurrence of stillbirths and children not surviving the first week is actually reduced in num-

Digitized by Google

TABLE I*

ANALYSIS OF 100 CONSECUTIVE CASES
INCIDENCE OF CONTRACTED PELVIS†

Justo Minor Pelvis	36
Flat simple	25
Flat rachitic	2
Funnel	43
	106 or 10.6 per cent

*From The Long Island College Hospital, Maternity Service.
†Every patient has careful prenatal mensuration—checked up again on her discharge from the hospital.

TABLE II

PRESENTATIONS
INCIDENCE OF ABNORMAL PRESENTATIONS

Breech	27
Face and Brow	6
Transverse	4
Twins	4
Complex, hand and cord	1
	42
Vertex	958
	1000

ber. Unless this can be demonstrated, meddling with the physiologic processes of labor should be discountenanced.

In this discussion we are not considering forced labor or its application to abnormalities, except in slight relative pelvic contractions, or where the patient has reached term and the child promises to exceed the normal limits, but we are discussing intervention in the course of normal labor to shorten the process, and to relieve the woman of a few hours of suffering.

Regarding hydrostatic bags, certain questions must be put and answered. 1. Are they free from danger? 2. Do they always induce labor? 3. Do they increase the frequency of operative termination? To the first of these queries we must answer in the negative, for in

TABLE III

ANALYSIS OF VERTEX CASES

L. O. A.	496
L. O. P.	28
R. O. A.	128
R. O. P.	306
	958

Spontaneous anterior rotation was the rule.

TABLE IV

Primipara	506
Multipara	494
	1000

Incidence almost equally divided.

Digitized by Google

our experience, which has not been inconsiderable, the introduction of the bag has increased the danger from infection, has displaced the presenting parts, has caused malposition, and has allowed the presentation to become complicated by prolapse of the arm and cord.

In Reed's two hundred cases, twelve babies were lost; this is over three times the mortality rate which has occurred in our clinic from a study of a long series where every patient has been treated on the principle of intelligent and aseptic expectancy. In Mosher's 270 cases, there were three prolapsed cords. This is several times the incidence found in normal labor.

If we are correct in our belief that there is real danger in making vaginal examinations in labor during the first stage, and if we admit that rectal examination really cuts down the dangers of contact infection, and that vaginal examinations add something to the risk of infection, then how can we accept putting a foreign body in the cervix which remains there, obstructs drainage, and increases traumatism and thus adds to the dangers of infection?

As teachers let us at least be consistent. Does the introduction of a bag always induce labor? Here again we must answer in the negative; for in Reed's series a second bag had to be introduced in four cases, and all of us have had the experience that labor often ceases with the expulsion of the bag from the cervix. On several occasions we have seen the cervix recontract and labor pains entirely cease after the bag has been expelled.

One of my patients expelled three bags and then went on for two weeks without labor pains when she spontaneously delivered herself.

Forced dilatation of the cervix, notably in multiparae, does not necessarily induce labor. The idea that we can always induce labor by dilating the cervix is erroneous. This observation has been noted and reported on by many careful clinical observers.

In Dorman's excellent review of dry labors at the Woman's Hospital, he definitely states that induced labor is followed by a higher operative termination than in labors allowed to end spontaneously and concludes with the following remarks:

"The use of the dilating bag even when employed to induce labor, did not reduce mortality and seemed unfavorable to the fetus: with an operative termination of 54 per cent of such induced labors, an average of over 12 hours, the question arises as to whether induction of labor by bags is justifiable."

The number of forceps and versions in both Reed's and Mosher's series show a higher incidence than is common in good obstetric practice; consequently we feel that induction of labor in the minor degrees of contracted pelvis is not for the best interests of the mother or the child, and as for induction in those cases where the patient has supposedly reached term, we feel that until we can accurately determine

Digitized by Google

the beginning of pregnancy we cannot even with mensuration accurately determine when it should terminate.

TABLE V

CONDITIONS COMPLICATING THE PREGNANCY AND LABOR

Endocarditis, decompensated	
Mitral stenosis	4
Mitral regurgitation	3
Complete premature separation of the placenta	2
Partial separation	9
Large fibroid tumors of the uterus	3
Subluxation of the sacroiliac joint	1
Toxemia of the later months	37
Placenta previa	2
Prolapsed cord	2
	63

Furthermore, so many of these cases surprise us by having a spontaneous delivery that it is but fair that they all should have the test of labor, and then be handled on their obstetric merits.

Shortening the second stage of labor by the use of pituitary extract, or the routine use of prophylactic forceps with lateral discission of the soft parts, should not be taught in our medical schools. Pituitary extract is never safe while the child is in the uterus, for the tetanic spasm which it occasionally induces and which cannot be foretold,

TABLE VI

INCIDENCE OF OPERATIVE INTERVENTION

Forceps, low and median	22	
Version, internal 3		
Version, bipolar 2	5	
Induction of labor by bag for toxemia	4	
Manual conversion of face to vertex	2	
Perforation of after-coming head	1	
Cleidotomy	1	
Cesarean section	8	
	43	
Incidence of forceps		2.2 per cent
Incidence of cesarean		0.8 per cent
Incidence of version		0.5 per cent

TABLE VII

THIRD STAGE, CONDUCT IN 1000 CASES

Spontaneous delivery of placenta after signs of separation were evident, with or without pressure on fundus		997
Manual removal of retained placenta		3
		1000
Blood loss, varying from	10-200 c.c.	309
	200-400 c.c.	501
	400-500 c.c.	137
	Over-600 c.c.	3
		1000

Digitized by Google

has cost the life of many babies, even when the head has been in the vagina. The spasm induced has repeatedly separated the placenta from its uterine attachment or so compressed it against the fetal tampon that the placental circulation has been cut off.

Does shortening the second stage by surgical anesthesia, forceps extraction, and discission of the soft parts, thus relieving the woman of an hour or two of pain which can be safely controlled by chloroform a la Reine, or gas-oxygen anesthesia, leave the woman in a better physical state than less heroic measures?

While we know that this can be and is done by the expert with little or no ill effects to either mother or child, we feel that such pernicious teaching in the hands of the practitioner will cause even more damage, morbidity and mortality to both than we are getting with more conservative methods. For our own experience has been that, given a normal pelvis with a cephalic presentation in one of the anterior positions, the woman who delivers herself spontaneously, even without the presence of a physician, has less actual injury to her structures, than when she is attended by some one who makes an attempt at disturbing the physiologic processes.

TABLE VIII

MORBIDITY

Rectal examinations used exclusively, except in dystocia
Morbidity—A temperature of 101° F. for over 24 hours is charted as a febrile convalescence

Febrile puerperia	59
Afebrile	941
	1000
Morbidity	5.9 per cent

TABLE IX

COMPLICATIONS OF PUERPERIA

Febrile puerperia	59	
Infection of repaired perineum	11	
Pelvic cellulitis	26	
Thrombophlebitis	6	
Blood stream infection	9	
Mastitis	7	
	59	
Of the blood stream infection		
Culture showed viridans in	3	
Culture showed streptococcus longus in	6	
Deaths, in 1000 cases		
From influenza pneumonia	1	
From puerperal infection (Streptococcus viridans in blood stream—same obtained from throat on admission)	3	
	4	
Mortality	.04	
In 4500 consecutive cases, including this 1000, 7 deaths, making a mortality for our last 4500 deliveries		.0015 per cent

Digitized by Google

Time and physiologic dilatation with the bag of waters intact is the only way that cervical injury can be minimized. That version has a distinct place in obstetrics is admitted, and there is no doubt that its indications should be wider, as a large proportion of our occipitoposteriors would be better treated by version than by our present method of expectancy. Moreover we owe to Potter a great debt in perfecting and popularizing his improved technic of version, but with it all, he has not established *its* indications though he has essayed to establish *his* indications. Version cannot be considered an elective procedure in normal cases.

TABLE X

ANALYSIS OF FETAL DEATHS IN 1000 CONSECUTIVE CASES

Stillbirths.
X 1 Large head, breech presentation
X 2 Large head, breech presentation
X 3 Large head, breech presentation

(Comment—There is always difficulty in estimating size of after-coming head.)
4 Accidental Hemorrhage
5 Accidental Hemorrhage
6 Placenta previa
X 7 Version of transverse, cord around neck, breech extraction.
8 Toxemia
9 Toxemia
10 Toxemia
11 Toxemia
12 Premature Syphilis
13 Macerated 2nd twin—1st living
14 Macerated 2nd twin—1st living
X 15 Full term, vertex asphyxia—2 coils cord around neck
X 16 F. I. Stillbirth—cause not determined
17 F. I. " " macerated
18 F. I. " " macerated
19 F. I. " " macerated

Infant deaths;
X 1 Acrania—died in 3 hours
2 F. I. died in 4 days
3 F. I. died in 4 days
4 F. I. died in 4 days—premature
5 F. I. died in 4 days—umbilical hemorrhage
6 F. I. died in 1 day.

Stillbirths	19	1.9 per cent
Infant deaths in first 14 days	6	0.6 per cent
Stillbirths and deaths up to 14 days	25	2.5 per cent

Six—checked (X) stillbirths, might have been saved had our obstetrics been more nearly perfect.
The remaining 13 were beyond all hope, even had we been perfect obstetricians.

In 4500 consecutive deliveries—Cause of 7 Maternal deaths.
X 1 Postpartum hemorrhage
2 Accidental hemorrhage
4 Mitral stenosis—broken compensation, not confirmed.
3 Influenza-pneumonia
X 5 Puerperal Infection
X 6 Puerperal Infection
During epidemic following Influenza
X 7 Puerperal Infection

Digitized by Google

Elective cesarean section is being done for constantly widening indications, and undoubtedly has a place in our obstetric armamentarium, but here again this easy method of delivery is being used too freely and without well grounded obstetric indications.

In two hundred cases of labor in contracted pelvis, recently studied, we found that 81 per cent delivered spontaneously, or the labor was terminated with low forceps. This certainly shows that each case of relative contraction is at least entitled to a proper test of labor before the abdomen is sectioned.

While the application of forceps to the engaged head in the presence of properly prepared soft parts is admitted to be a most valuable procedure, both in the interests of the mother and the child, when the fetal arrest is due to failing powers, it has its limitation of safety as a routine measure, and definitely increases trauma to the soft parts. Therefore, we feel that shortening the second stage by intervention with the forceps is not justifiable as a routine measure any more than eliminating the second stage and delivering every child whose head will come into the brim, by elective version and extraction, with no other indication than to eliminate the second stage of labor and thus relieve the woman of the pains and agonies of childbirth. Neither is it safe teaching for the student or graduate without months or years of special training.

Take Potter's own report before the Philadelphia Obstetric Society, of 1,113 labors with 920 versions and 80 cesarean sections, with a fetal mortality of 6.7, and compare it with the figures resulting from intelligent expectancy and indicated intervention which I will show you in subsequent tables.

All of Potter's cases were attended by himself, a trained expert, whose experience in version is probably greater than any other living man, yet his operative incidence is so much greater than has been shown to be necessary in good practice, and his fetal mortality so much higher, that I cannot see on what ground he claims endorsement for his procedure.

Furthermore, cesarean section is not without its morbidity and its mortality. Beck showed that there was a 30 per cent morbidity in his study of 107 cases. Rupture of the cesarean scar is not an unknown possibility and, in my collective study of 2,000 cases done by the leading operators throughout the country, there was a mortality of nearly 10 per cent, and of over 2 per cent in the elective group.

Another precedure that should come up for consideration and comparison, is hurrying the third stage of labor by expression of the placenta with the first uterine contraction after the child has been delivered. This is definitely unphysiologic in that it takes time for the uterus by its contraction and retraction, to separate and expel the

Digitized by Google

placenta and produce proper uterine hemostasis. While this practice may be safe in the hands of the trained specialist, it is bad practice and bad teaching for the practitioner and for students.

A careful study of the foregoing statistics can leave no question in the mind of any of my auditors that for the ordinarily trained man, intelligent expectancy and indicated intervention in the interest of only the mother and child, not for the convenience of the practitioner, is the safest practice and is surest in its results.

Digitized by Google

THE DRUDGERY OF OBSTETRICS AND ITS EFFECT UPON THE PRACTICE OF THE ART, WITH SOME SUGGESTIONS FOR RELIEF

By Brooke M. Anspach, M.D.
Philadelphia, Pa.

TO RECITE the demands made upon the practitioner of obstetrics, that constitute the drudgery incident to the practice of the art, is like carrying coals to Newcastle. For the purposes of this paper, I shall mention briefly only those that seem to be the most distressing.

The uncertainty as regards the time of onset of labor is proverbial. Who can determine in a given case precisely when labor will take place? Although, in a majority of instances, computed by the customary rule, the date can be fixed approximately, a variation of from ten days to two weeks is not unusual. Such variation cannot be regarded as abnormal so long as there is no way of ascertaining precisely when ovulation and conception took place. This uncertainty leads to much annoyance and inconvenience for the patient, her family, the doctor, the nurse, as well as for the management of the hospital, if she elects to go to one, in which she is to be delivered.

It is upon the obstetrician especially that the burden falls most heavily. Thus he finds it difficult to leave town or must delay his going, since some one is always overdue; or if the coast seems clear and he is permitted to depart in peace, an unexpected or premature labor is sure to call him back. And so his plans invariably miscarry, for he is either detained at home, or sent for when he leaves.

As soon as the patient falls into labor, the obstetrician must revise his daily routine to some extent at least, rearranging his visits and his work so as to be able to reach her as quickly as possible, or he may accept the risk of the day's work and trust to good fortune to be on hand when he is needed. In complicated cases there is no choice, for here he must be in more or less constant attendance throughout the entire labor. How frequently it happens, in such cases, that, at the end of an extended period of observation, the best judgment and skill of the obstetric attendant are required to effect a successful outcome, and this, too, at the most inopportune time, when the physician is exhausted and physically and mentally unfit to undertake the work.

It is doubtful whether there is any more troublesome exigency in any branch of medicine or surgery, or one that requires more well-balanced judgment and greater skill. Neither is there any situation in which the physician feels more keenly the burden of responsibility—

Digitized by Google

the mother and the child, the anxious relatives. It is an undeniable fact that at this time, in order to do his work most successfully, the obstetrician, as well as his nurse and assistants, should be unfatigued.

Upon the obstetric nurse the hardship is in some respects even greater. She it is who spends weary hours listening to complaints, attempting repeatedly to comfort the patient, who, forsooth, cannot be comforted. She must bear the stress of possible operative delivery at the conclusion of this trying period, followed by the immediate after-care. She has two patients instead of one. In private home cases many additional cares are added to her already heavy burdens—the preparation of meals, the laundry, dealing with the servants and members of the family, etc.

As a consequence, many physicians and most nurses dislike obstetrics, and avoid it to as great an extent as possible. It is often quite difficult to persuade a good surgical nurse to undertake obstetric nursing. The number of physicians who endeavor to practice obstetrics is small as compared to those who enter other specialties, and in the nursing field the most skillful workers do not commonly select this as their chosen sphere of usefulness.

What is the result of the unusual demands made upon the time, convenience, and patience of the obstetrician? Does it influence him in his conduct of labor? First of all, it is natural that, in order to save himself as much as possible, so that he may be in better condition to overcome the difficulties that he may be required to face later, the obstetrician may not, during the earlier stages of labor, give his patient the close attention she might reasonably expect to receive. The question here arises whether obstetricians as a class are doing all that is possible, under existing conditions, to alleviate the pains of the first stage of labor. "Twilight sleep" has come and, fortunately, gone. Was there not, however, some little truth, at least, to be taken from it? Would it not be desirable to do a little more than is done usually to ease the sufferings of the first stage, for example, with either morphine and scopolamine, or with nitrous oxide and oxygen, or with all of these combined? And in the second stage, is the obstetric attendant usually at hand to begin analgesia as soon as complete dilatation of the os is accomplished? Does not the patient often wait weary minutes or even hours until the obstetrician arrives? May it not be merely the joy that the pain is over and that another soul is born into the world that keeps some of our patients from reminding us of the pains they have been permitted to suffer and to reproach us for the little we tried to relieve them?

It is not hard to perceive that efforts, conscious and subconscious, are made to remove these difficulties in obstetric practice. The expectant mother grasps quickly at any new plan that will bring on her

Digitized by Google

labor at the appointed time, that will hurry it along and save her from pain, etc., little knowing or weighing the disadvantage to herself or to her baby. And the obstetrician, no matter how conscientious he may be, is almost tempted to induce labor at a set date, administer stimulants for the pains, and adopt manipulative or operative measures to shorten the period of parturition. But who would have the temerity to declare that an artificially induced, conducted, or terminated labor is as safe for the mother and the child as a normal one? And are we not all agreed that the best plan is to let the obstetric patient alone until some actual indication arises for giving assistance?

This problem, and it is by no means an easy one, of relieving the practitioner of the drudgery of obstetrics, is yet to be solved. We can do no more than formulate plans, and then put them to the test of experience. With this purpose in view, I venture to offer the following observations and suggestions:

While the almost general and universal use of hospitals for obstetric cases has infinitely lessened the drudgery of obstetrics, much is still to be desired in the direction of securing close cooperation between the obstetric intern and the practicing obstetrician. The obstetric intern should not only be permitted, but should actually be trained to examine the women in labor under his care. Indeed, before she enters the hospital, the patient should be made to understand that the practicing obstetrician will call into cooperation with him, the obstetric intern.

During pregnancy the obstetrician should be careful to write a full history and make complete and regular notes of visits and examinations, including the results of pelvimetry, the diagnosis of position, etc., which should be sent to the hospital as soon as the patient goes into labor. These notes, with perhaps a telephone conversation, will give the obstetric intern the information he requires. As a result, he will be better able to look after the patient during the early stages, and will summon the obstetrician when he is needed. In the larger maternity hospitals fresh attendants may be provided throughout labor by a shifting staff of anesthetist, two nurses, and an obstetric intern, every eight or twelve hours.

If the period of labor of a patient continues beyond the time allotted to the staff on duty when she is admitted, the notes made by the first staff may be turned over to their successors. By this plan perfect analgesia throughout labor may be maintained by well-trained attendants who are unfatigued and thoroughly awake to the necessities and requirements of the case. There need be no attempt to hurry labor, unless this appears to be to the distinct advantage of the mother or child. Induced labor will be unnecessary, and if the patient requires skilled operative or manipulative attention, this can be secured from

Digitized by Google

one who has not borne the stress of the earlier stages, and who is unfatigued and therefore at his best.

An elaboration and possibly an outgrowth of this plan would be the association of several obstetricians, men of approximately equal standing and experience in one maternity hospital. Instead of engaging a particular obstetrician to care for her, the patient would enlist the services of the group collectively, stipulating that she would be willing that any one of them should look after her, the choice depending upon the time of her delivery.

In certain large surgical centers, a patient is not permitted to name his surgeon, the selection being made by the management. The layman is satisfied with this arrangement since he realizes that, after all, it is to his advantage. So, too, the laywoman appreciating that what is done is to her advantage, might grow perfectly content. She might then look confidently forward to securing comfortable accommodations, regardless of when labor begins, to perfectly conducted analgesia, and to the services of a skillful obstetrician at his best. She would be spared the induced labor, the long hours of indifferent or absent analgesia, and the anxiety of waiting for the physician to come. The result to women as a whole could scarcely fail to show improvement. More physicians and nurses would take up obstetrics enthusiastically, and the most important episode in the life of any woman would receive the careful and skillful attention it deserves.

DISCUSSION ON THE PAPERS OF DRS. RUDOLPH W. HOLMES, JOHN O. POLAK AND BROOKE M. ANSPACH

DR. IRVING W. POTTER, BUFFALO, NEW YORK (by invitation).—I appreciate your invitation to open this discussion. I have been very much gratified at the papers and very much entertained by the statistics. I am not sorry that I read my first, second and third papers on version, for I can see a considerable change in the expressions of opinion from observers in different sections of the country, and I am going to continue to read papers on version and to do the operation. I am striving all the time to reduce my fetal mortality since the presentation of my first paper. I have had better results since. I am sure that I will get still better results and so will every one who does intelligent elective version.

Our conditions at home are somewhat different from those that most of you have. We have no large hospital where we can take all of our cases. There is not a hospital in Buffalo that will give me the number of beds I want, consequently I am working in five or six different institutions. That in itself will raise the fetal mortality, will raise morbidity, but things are gradually getting better, and it is gratifying to me to find that men from different parts of the country, after they come to Buffalo and see me at work, have changed their views in reference to my work from those they held five years ago.

It seems to me, that the discussion of these papers must be largely upon the following questions, first, whether or not we have any right to interfere in the progress of a case of labor, whereby we may in any way shorten the duration of that labor in the interests of the mother, to relieve her of her suffering and pain as well as the damage to her soft parts from prolonged pressure, and secondly,

Digitized by Google

in the interests of the child, in relieving pressure both cranial and body. Have we any right to relieve pain? It seems to me that we have. Have we any right to shorten labor provided no damage is done to mother or child? I think we have.

Granting that we have such right, how shall we use it? Personally, I am opposed to the induction of labor and the use of bags. Bags do not give the obliteration of the cervix desired nor the degree of dilatation of the os that is required. Such obliteration and dilatation must occur from the rearrangement of muscle fibers beginning at the fundus and not from the cervix. Bags also have a tendency to displace the presenting part and allow prolapse of the cord or one or more extremities. My preference in the management of these cases is to do an elective version. By that term I mean to perform podalic version at a certain time during the progress of the labor and that time is at the end of the first stage or early in the second stage, thereby endeavoring to eliminate the second stage entirely or at least the greater part of it. In view of the fact that so many complications arise, is not this method of early version justifiable?

My claims for such a procedure are that patients suffer less pain, are less liable to infection because of the lessened mutilation of the soft parts, have a better involution of the uterus, and a better sense of well-being at the end of the lying-in period. No cystoceles or rectoceles are seen following this procedure when properly performed, and extensive lacerations are unheard of. Neither need one fear hemorrhage.

As to the child, we have frequently observed that it was easier to deliver a larger child by version, than it was by an oncoming head; that the damage to the child was far less apparently, than in prolonged forceps operations; that the children are in as good, if not better conditions at the end of 10 days as to gain in weight and general appearance, than in cases where a prolonged second stage was allowed. Our maternal morbidity is less than formerly and the maternal mortality should be *nil*. The fetal mortality we claim is lowered. Our latest statistics covering our last 1000 cases show a 4½ per cent fetal mortality.

Mr. President and Gentlemen, this is not a fad or a fancy, but a procedure that is allowable in the hands of a properly trained man. These statements are facts and can be substantiated by hospital records.

Surely, with our present knowledge of asepsis, if we cannot invade the uterine cavity with safety in the interests of the suffering woman, then I must agree with Dr. Holmes that obstetrics is a lost art.

DR. JOSEPH B. DE LEE, CHICAGO.—In the first place, I desire to dispose of some of the arguments which my colleague (Dr. Holmes) from Chicago has advanced.

The statistics which he has adduced are some old, some new, mostly bad and useless. Statistics in general are very insecure building stones on which to base judgment. The statistics of Newark should not be applied, even if they are true, to the general practitioner neither should they be applied to this Society. Dr. Holmes is charging windmills in a great many of his remarks.

Let us eliminate from the discussion cesarean section for placenta previa. Let us also eliminate the treatment of eclampsia by active measures. Let us limit it to the five points which Dr. Polak has brought out, and which really are the subjects for discussion.

With one sentence I will dispose of pituitrin. Pituitrin in my opinion is an almost criminal agent if used before the delivery of the child.

Regarding the early expression of the placenta, Dr. Polak is right. The placenta should not be expelled before it is completely separated. If the placenta is in the vagina, usually visible without pressure, but if not visible without pressure, visible by separating the labia, there is no reason why it should not be expelled, and its expulsion by pressure on the fundus will not increase the hemorrhage.

Digitized by Google

Regarding the so-called prophylactic forceps, a name which I have the honor and perhaps disgrace to have introduced, there are present before me a certain number (how many I cannot tell) who are doing prophylactic forceps right along. Some of them have acknowledged it to me. That is not to their discredit; I consider it to their credit. We must, as Dr. Polak points out, prove that this interference in labor brings good results, and that in course of time we will probably be able to do.

The time has come, and for some of us has long passed, for a division in the methods of treatment of natural delivery into that by the specialist and that by the general practitioner. The women are beginning to realize that they need not suffer the damage of labor, the permanent invalidism and death that their mothers suffered. They have learned to seek expert skill and they are willing to pay for it. Further, they are not willing to suffer the pain of labor, and demand its relief.

Many women are ready to undergo the slightly increased risk of cesarean section in order to avoid the perils and pain of even ordinary labor. I am confident that if the women were given only a little encouragement in this direction, the demand for cesarean section would be overwhelming.

A careful study of one's own cases will show that even natural labor can cause much damage. The damage is mainly in the cervix, the pericervical tissues, the pelvic fascia and the pelvic floor. It is unnecessary to enumerate the many sequelae of these injuries. We cannot deny their frequency and their rôle in the causation of permanent invalidism. In the last two years I have paid particular attention to these damages. One in five mothers has good closure; four have tears or relaxation, though there need not be bad symptoms at present. These come later. With few exceptions, all women show evidence of anatomic damage.

We know that too many babies die in labor, even in natural deliveries, yet when last year I presented a simple and harmless method for saving a percentage of these babies, several of our members criticized the method unfavorably.

Last year I read a paper called "Prophylactic Forceps." In the discussion, our guest, Dr. Eden, of London, condemned the operation. On the same day Dr. Eden complained bitterly of the high mortality of the neonati of his clinic and the large number of stillbirths. Fifty healthy babies, he said, had died in spontaneous normal labor in the hands of his own expert assistants, and he thought something ought to be done about it. I, too, think something ought to have been done about it, and I wonder how many of these full term, healthy babies might have been saved by the prophylactic forceps operation. If I may be permitted to hazard a guess, I would say perhaps 40 of them. However, it was a great concession by Dr. Eden, to admit that normal labor could kill babies, and I am also wondering how he can escape the conviction that natural labor is pathogenic.

I claim that the powers of natural labor are dangerous and destructive in many instances to both mother and child, and that interference by a skilled accoucheur at the proper time can prevent a goodly portion of this danger and much of this destruction.

It will need a high degree of obstetric skill to determine when interference is less dangerous than Nature's own methods, and to render the interference less dangerous, but the first is what we specialists are for, and the second, is what we are being paid to do. There is no question that in unskilled hands, many things that we can do with safety, will prove dangerous and fatal, but this is no reason why we should not do them.

We must not pull obstetrics down to the level of the practice of the general practitioner. We must pull the latter up to our level.

As to one method of interference in natural labor, I can refer to my paper of last year, the prophylactic forceps operation. The objects of this procedure are: 1. To save the pelvic floor and fasciæ from destruction. 2. To save the woman from

Digitized by Google

exhaustion and hemorrhage, even moderate bleeding. 3. To save the child from injurious pressure or death. The essentials of the method are: 1. Procure complete spontaneous dilatation of the cervix. 2. Use morphine and scopolamine or other narcotics freely in the first stage. 3. When the head has come down on to the pelvic floor, and before the fasciæ have been destroyed and the levator ani pillars parted, incision and forceps delivery. 4. Pituitrin and ergot to save blood. 5. Early removal of the placenta from the vagina. 6. Anatomical repair. 7. Morphine and scopolamine to save ether and produce amnesia of the labor.

I had the opportunity to demonstrate this operation to Dr. E. C. Dudley, Dr. Austin Flint and Dr. Brooke M. Anspach. The two first named were enthusiastic and readily admitted that both mother and child had suffered less damage than in a normal labor. Dr. Anspach may express himself here. I believe many of those present frequently deliver women early in the second stage, but do not publish it.

For Dr. Potter's method of delivery I have no sympathy. His own declared results condemn it. He had 10 fetal deaths from hemophilia, 14 deaths from convulsions, 5 unexplained deaths, in addition to 41 deaths during delivery itself, in 1100 cases. His own published mortality of 1123 cases, including 80 cesarean sections, is about 7.5 per cent of the babies. This is much too great, and these women are paying too high a price for their relief from pain in the second stage. At the Chicago Lying-in Hospital under conservative management in the last 9258 cases we have had a gross mortality of 336, or 3.6 per cent. This includes all premature children after the seventh month, weighing 1000 grams or over; it includes all macerated fetuses (86), monstrosities, and also those children born alive and dying before the mothers left the hospital. There were 228 stillbirths and 109 dying after birth. Only one child died from hemorrhage; 1 in 9258. Dr. Potter had 10 deaths from hemorrhage in 1123. It is well known that injury predisposes to bleeding in neonati. One of Dr. Potter's disciples published fetal mortalities ranging from 8 to 17 per cent. Dr. Potter claims that he has no more or greater lacerations with his version than the ordinary practitioner. This argument has weight against his method of delivery. We must learn how to reduce, we cannot eliminate, the damage of labor.

DR. RALPH POMEROY, BROOKLYN, NEW YORK.—I personally have no definite opinion about this matter. I am trying to learn something at this time, and I have been through certain stages of development that almost call for presentation, because I find myself very curiously in a position among the profession of being a radical among many followers of extreme conservatism, and I do not know exactly how to account for it.

In the first place, some 15 years ago I presented for the first time a dilating bag that created a good deal of commotion. Everybody who understood mechanics thought it would do the thing I supposed it would do very nicely, and that is, expand the cervix, but soon after I had published the matter it was taken up as a method of inducing labor. I was never willing to induce labor with anything except by the usual means, consequently I have had the reputation of inducing labor with an apparatus with which I never intended to induce labor.

In the next place, I advocated one principal kind of incision of the perineum as a prophylactic measure, and I have been accused of cutting everything. My own immediate assistants know that is not true, and that the cases are selected.

With regard to the work of Dr. Potter, I sent my own assistant to see him work, and I repudiate any possibility that I am likely to imitate Dr. Potter. I have a most emphatic and wholesale admiration for the development that Dr. Potter has made in the mechanics and surgical process of podalic version plus extraction, but to revert to the general proposition, the principal point I wish to make is that our units of conservation in labor and pregnancy are not the first born but the family,

Digitized by Google

and I refuse to follow Dr. Potter to his logical conclusion that every large child must be taken out by a cesarean section, because it will not be easy or safe to take it in any other way.

With reference to delivery by cesarean section, Dr. Potter has done it on one of every 13 cases. In other words, there are 18 deliveries by cesarean section in his report of 1000 cases. It is a perfectly logical thing to do if we think of obstetrics in the extreme cases as well as in the moderate and in the minor. Does this assembly accept the proposition for one minute that safe obstetrics is midwifery obstetrics? Of course, it does not. The trouble with obstetrics is that we know a whole lot about it and are just as much entitled to have progressive radicals in trying to see what can be done with serious problems as the surgeons have, because this is a major subject in surgery.

Dr. Potter should be honored, and Dr. De Lee should be honored, as well as others, who have published books on obstetric surgery, for their enterprise. But who practices our obstetrics? Midwives, trained and untrained, students trained and untrained, and interns, all amateurs, most certainly should receive training in this regard, and perhaps a few of us who practice obstetrics. There are not enough obstetricians to go around. The individual woman knows what she wants, and Dr. De Lee and Dr. Anspach have indicated that very clearly, but Dr. Anspach should remember one point, that he will never get any woman to be cared for at his invitation or agreement. She selects her obstetrician as she selects her bridesmaids. In other words, pregnancy and labor is a social event and not a physical event. The woman wants to get away with it with safety and comfort, and with no actual damage, and she hopes there is some one who can carry that out.

My experience is that the only way we will ever solve this problem in an institution of magnitude is by being residents in the institution, one relieving the other every twelve hours, and then we may slip up if we do not have a system by which every item of fact is exchanged in connection with the case when a new man comes on. In cases of prolonged labor it is much better to work in relays rather than adopt the mental attitude and mental picture of the surgeon who is trying to see a case through from one end to the other.

In connection with the statistics given by Dr. Polak and Dr. Holmes, the one thing to be brought out is that obstetrics is not practiced as it is known. In other words, the execution of our work is not up to the standard of our knowledge, and it is extremely difficult to make it so.

DR. PHILANDER A. HARRIS, PATERSON, NEW JERSEY.—I wish to speak from the standpoint of the psychology of Dr. Holmes' statistics as presented to us in his very elaborate tables and in his very extensive review of cases. He referred to Newark; I live near Newark. He spoke of better recoveries and a less mortality in the hands of midwives in Newark than among members of our profession. I think it would be a mistake to publish that statement in a report of our proceedings or in a medical journal and let it go broadcast, because this information would be placed in the hands of a lot of people who belong to the extremely radical elements of socialism.

We know that industrial health insurance has to be fought out in almost every state in the Union. The New Jersey Medical Society this winter spent a tremendous lot of time on this subject, and some of our best physicians went to Trenton for weeks to see the representatives of the legislature, and what for? To prevent having industrial health insurance put over in New Jersey. At the same time, they had two other duties to perform. They had to work to prevent osteopathic practitioners from getting a full board of examiners, so that they could follow their kind of practice in New Jersey.

I sincerely hope that when Dr. Holmes publishes his paper, he will keep in mind

Digitized by Google

that the midwife, as I understand it, does not have any deaths. When her cases are bad, they fall into the hands of others, who make out the death certificates, and Dr. Holmes should revise or rearrange that part of his statistics which will show this. It is of great importance that this be done now, because unless his statements are corrected or modified, they will be the first thing we will hear about in the legislature this winter.

DR. EDWARD P. DAVIS, PHILADELPHIA.—Spontaneous delivery is not without injury. Concerning the discussion this morning, it points very clearly to our condemnation of two things. First, pituitrin before the child is out of the uterus is dangerous. Second, I am glad to know we have learned that a dilating bag cannot dilate the uterus successfully because it does not favor retraction of the cervix uteri.

We must first consider the good of our patients, which should be the first aim, and then the good of our profession. Dr. Potter and Dr. De Lee illustrate what skilled specialists can do. Other men devoting the same time, with very similar lines of research and practice, will do as well. What is the profession to do? I would speak as a teacher who is accustomed to addressing men who are shortly to become practitioners. This is my expression to the senior class: I hope that few of them will undertake major obstetric operations; that such operations should be done by specialists only, and I do not believe in making serious obstetric procedures attractive or apparently easy for the graduating student. The graduate student should be taught carefully the signs of normal labor and its mechanism and the physiology of analgesia and anesthesia in normal labor; delivery of the patient by spontaneous parturition, the immediate closure of lacerations; the methods of asepsis and, when a normal labor is attended with difficulty, it is time for expert skill. The profession should stand firmly on that ground and the public should be educated to that point of view, and not until then will there be a substantial improvement in obstetrics. I deny absolutely that the best operators in this country are doing wrong in spreading the doctrine to apply skill, intelligence and judgment toward terminating the sufferings of mothers and saving infant life. I do not believe that for one moment. Great advances have been made in the treatment of toxemia and in obstetric surgery, but the latter must be done by obstetric surgeons, and I do not believe any recent graduate can so denominate himself justly and rightly.

Furthermore, we still lack in this trial two important portions of evidence. You have heard the claimants present certain statistics. The statistics of pediatricians and neurologists must also be brought forward, which will tell us how many infants have epilepsy or deficient mental development. Let them report these conditions, and let us know how many of these cases, where epileptic convulsions or deficient development followed, occurred after spontaneous parturition. In the second place, the statistics from the gynecological clinics should be presented, showing how many patients required a secondary operation for repair who were delivered by obstetric surgeons. Then we will be able to come nearer the truth.

DR. WILLIAM S. STONE, NEW YORK CITY.—I cannot refrain from expressing one thought in this discussion which I regard as a most important review of obstetric therapeutics; and I am particularly impressed with the expression which Dr. Polak used which, it seems to me, goes to the basis of the whole thing, that is, intelligent, aseptic expectancy. I regard that as the basis of teaching, and that upon that principle a man should be taught to carry out obstetrics, but who is going to do that? I am quite sure that the expectancy part makes it an impractical thing for any of the men assembled in this room, except the experts in obstetrics, to carry out, and Dr. Anspach suggested something in the way of a remedy.

I would like to call your attention to one thing as I have observed obstetrics develop in New York. We do not really have consulting obstetricians. Our obstet-

Digitized by Google

ricians are professors of obstetrics, they take cases of obstetrics themselves, and the result is that I do not believe that men who are so busy can carry out all the knowledge which we have of obstetrics. In other words, in medicine we have consulting medical men who do not take cases of pneumonia themselves or typhoid fever cases, but they come in as real consultants. It seems to me, there is a field to be developed here, and that for those of us who are skilled obstetricians to limit our work and to give the benefit of our experience in the way of consulting work, and then our teaching will be based upon the principle that Dr. Polak has suggested.

DR. GEORGE W. KOSMAK, NEW YORK CITY.—I am rather astonished at the character of the statistics brought forward by Dr. Holmes, and I think very likely I express the sentiment of wonder in the minds of a great many of us here at the advisability of bringing them forward in a discussion of this kind. These statistics on the various abnormalities of pregnancy and labor, which refer to observations made 50 or 100 years ago, I think are hardly a fair basis for comparison because at that time the standards were different. There were a great many conditions then accepted which we would not accept at the present day, such as puerperal fever. I think almost every pregnant woman, during the first fifty years of the last century who went into labor, expected to have puerperal fever, and for that matter they felt that labor would necessarily last a considerably longer time, especially in a first pregnancy. It is hardly fair to accept the statistics of the earlier writers in comparison with what has been accomplished during the past few decades.

I believe that Dr. Holmes is entirely too pessimistic as regards the obstetric situation, and that we are warranted by the accomplishments of the last few decades, in assuming a more optimistic attitude.

I desire to refer also to the remarks made by Dr. Harris which I had hoped he would develop somewhat further. Gentlemen, we are facing a rather serious proposition as obstetricians because our state of mind is going to be very much shocked within the next few years by the efforts at reform by lay persons, methods that will not be based on medical facts and on medical experience, but on sociological experiments. You will have brought before you at the executive meeting of this Society a report by the special committee appointed last year to consider this subject of maternal welfare in a broad general way in connection with other committees from other societies. I hope you will bear in mind the discussion today when you consider that report. Specifically, I desire to refer to legislation now pending in Washington in the shape of the Sheppard-Towner bill which on the face of it is one of the most radical steps to which we as medical men have been asked to subscribe. It will practically take out of the hands of the medical profession the care of pregnant women and children, and place their observation in the hands of lay persons, not to be solved as a medical but as a sociological problem.

DR. FRANKLIN S. NEWELL, BOSTON.—There seems to be one point that has not been brought out in the discussion so far. I will say my own personal bias is in favor of Dr. De Lee's prophylactic use of forceps, but when it comes to the question of how every woman should be taken care of, we must study the needs of the individual patient. In the first place, one woman can be delivered with little or no anesthesia in spontaneous labor without any ill effects, while the next woman must have labor shortened, or she will suffer mentally or physically as a result of it. Some women are better delivered by version. To adopt any standard routine and say that a woman must be delivered by a certain method is unintelligent obstetrics. In regard to analgesia I believe that nitrous oxide reenforced by morphine or scopolamine, if needed, is the most valuable method of making labor easier for a woman. In delivering my patients I have nitrous oxide started when the patient feels the need of relief. Patients do not want the anesthetic postponed until we are convinced that they must have relief.

Digitized by Google

One other point I wish to bring up is that I do not believe in the induction of labor except for cause. If a patient needs to have labor induced, that is a different matter, but to interfere with normal pregnancy for no cause seems to me meddlesome and pernicious. I feel very strongly that most postpartum hemorrhages are due to unwise interference in the third stage of labor, and the longer the placenta there is left *in situ*, i.e., until complete separation has taken place, the better the results for our patients.

DR. ROBERT L. DICKINSON, BROOKLYN, NEW YORK.—This discussion sharply differentiates between the expert with his hospital experience, such as Dr. Polak has demonstrated, and the general practitioner who must take care of the bulk of cases, and the midwife who must take care of the foreign population.

Medicine is proverbially myopic. We refuse to see what the social workers see; therefore, the social worker has got busy and has proposed a remedy. What do we do? We try to thwart it.

The Sheppard-Towner bill is not what we prefer or favor; therefore, instead of taking half a loaf, we refuse bread. We refuse appropriations if the money does not go where it belongs. If it is not done by the state, it is helped by the nation, therefore it is bad legislation and we will refuse it.

Again, we have the name of not being progressive. We must welcome these statistics, however bad they are in form, on prenatal care. The President and apparently the Senate are feeling the pressure of popular opinion brought to bear on a measure which we are not in touch with. We teachers, we professors, are disappointed. I confess myself I am one of the most disappointed men that ever stood on his feet in such an assembly. For nearly twenty years I have tried what little I could do to leaven the mass of the obstetric work of the general practitioner, to raise that level. Gentlemen, whatever progress we have made in our maternities, we have failed to raise that level. Let us then in God's name welcome any outside help, however mistaken, for social health insurance and all that are inevitable. We cannot stop it.

DR. J. WESLEY BOVEE, WASHINGTON, D. C.—A great many years ago we had a definition of obstetrics by Dr. Goodell, "a fellow feeling for a human being." We have seen it emphasized here today I think to an alarming degree.

I want to speak, however, in opposition to the plea suggested by Dr. Pomeroy and of Dr. De Lee of treating patients as they wish. I hold that a patient should be treated as judgment dictates; that we should act as practitioners of medicine instead of those who cater to the wishes of our patients.

DR. JOHN A. MCGLINN, PHILADELPHIA.—Not long ago in this Society, I remember it was considered criminal to stick a hand into the vagina, although it was gloved. We had to stick the finger up into the rectum. Cesarean section should hardly ever be performed unless total hysterectomy was done. Still at the present time, in cases of normal delivery we have to do podalic version to get the whole arm into the uterus. To shorten the pains of the second stage of labor, we have to split the vagina and put on forceps, and these advances are good things.

So far as obstetrics is concerned, it is the same as any other problem in medicine. There is a good deal in common sense. You cannot lay down any hard and fast rules how to deliver every patient. You have to individualize, and these problems are individual. Prophylactic version may be the ideal thing in a certain case. Central episiotomy may be the ideal thing in a certain case, but podalic version is not an ideal thing in every case, nor is prophylactic forceps an ideal thing in every case, or central episiotomy. Certain cases will go through spontaneous labor without difficulty, and our problem is to recognize when cases are not normal and apply the proper remedy with our art and skill, whatever remedy that may be.

Digitized by Google

DR. N. SPROAT HEANEY, CHICAGO.—I take it that we, the audience, are to be the judges in this presentation of briefs, and since the evidence does not all seem to be at hand, I wish to ask for information.

The advocate of one procedure says that the cervix should not be interfered with in any way during the natural process of its dilatation and places all the importance upon the avoidance of laceration of the pelvic floor. Why is the pelvic floor so important while the cervix is unimportant as far as its injuries are concerned, and why should a method be elaborated which concentrates on the pelvic floor and disregards the cervix? If the spontaneous dilatation of the cervix is not dangerous, why is the spontaneous dilatation of the vagina and perineum so full of danger? Dr. Polak has given us some beautiful results to study and I think that we should be interested in the immediate results of labor and until they are impossible of improvement, we should not worry about the late results. A low child mortality is the real criterion as to the superiority of one method of delivery over another, provided the maternal mortality is the same in both instances. Another peculiarity in Dr. De Lee's presentation that I cannot understand is, that he elaborates upon the dangers of the caput succedaneum to the child and says that he avoids this with prophylactic forceps. The question is, since he never interferes with the first stage of labor, whether or not a caput succedaneum only forms in the second stage of labor. We know that it does not, since who among us has not seen a caput succedaneum on children born by cesarean section? This argument then will have to be discarded.

DR. HUGO EHRENFEST, ST. LOUIS, MISSOURI.—Dr. Davis has referred to a fact which is important in this discussion. He would like to have the neurologist testify as to the damage done by forceps extraction.

The neurologist indeed is the one who wants the baby extracted quickly because long-continued compression of the head in his belief is disadvantageous to the later physical and mental development of the child. Unfortunately the obstetrician has accepted this opinion, though as a matter of fact it positively is incorrect. It is based solely on statistics collected in institutions for the feebleminded and insane asylums, by asking the mother of such a feebleminded child whether she had a forceps operation, or whether she had a hard labor. Babies, stillborn after forceps delivery, obviously are not counted at all, and by simply taking the mother's word for it, the large number of those who had a hard labor is not surprising. Actual evidence now available proves beyond any doubt that intracranial damage is due rather to quick compression, to quick and excessive molding than to continued compression. This evidence has been supplied by obstetricians who have followed up their own cases and have compared end results with the exact history of the labor ten to fourteen years ago. Such investigations proved beyond any doubt that all procedures which hasten the passage of the child, and which cause quick and excessive molding, such as the use of pituitrin, of forceps or breech extractions, are more likely to be responsible for intracranial injuries manifesting themselves only later in life than merely a long labor.

DR. CARL HENRY DAVIS, MILWAUKEE, WISCONSIN.—As it has a definite relation to this obstetric symposium, I wish to report the results of a recent questionnaire sent to twenty members of this Society.

Last winter a surgical colleague asked me to examine his wife, a para ii, who had been delivered of her first baby by cesarean section because of a central placenta previa. She wished to go through a normal labor. He wished to know if this were safe since she has a normal pelvis. I went over the situation with the husband as regards the probabilities in the case, and gave him the results of my study of the literature. In addition, I sent a questionnaire to twenty members of the Society, stating briefly the facts and outlining a possible plan of management.

Digitized by Google

In answer to the question, "Do you favor the dictum.—once a cesarean, always a cesarean?" 13 out of 20 answered "No"; 7 out of 20 answered, emphatically "Yes"; 13 out of the 20, with more or less qualifications, favored giving this woman the test of labor, while 7 were opposed to any test of labor. The husband in going over the situation with the family and the two surgeons with whom he is associated finally decided that in view of the wide difference of opinion among experts, cesarean section should be repeated.

On the 16th of May the patient was delivered by the surgeon who performed the first section. It was found that for the most part there was a good scar, but at the upper angle of the old scar there was a very thin area about the size of a quarter. The scar was excised, the uterus again sewed up carefully and it is believed that she can go through a subsequent pregnancy with relative safety. She probably could have gone through this labor spontaneously, but with such a marked thinning of the uterine scar at one end, with a third pregnancy she might have had an early rupture.

Will Dr. Polak tell us whether or not in his private practice the number of operative deliveries are proportionately low? I judge that his statistics are from clinic cases, which, of course, do not correspond to cases specialists see in private practice.

DR. HAROLD C. BAILEY, NEW YORK CITY.—If we are to reduce our infant mortality, we must go back to the autopsy room and follow up the head cases where there is cerebral hemorrhage. In 100 consecutive cases in which the head was opened, nearly 50 per cent were spontaneous deliveries; 9 were forceps deliveries, and 6 were versions or breech extractions. The 50 per cent going on to forceps or breech extractions were operative deliveries for dystocia. Over 50 per cent with cerebral hemorrhage were spontaneous deliveries.

DR. FRED L. ADAIR, MINNEAPOLIS, MINNESOTA.—In following up the causation of hemorrhage in the newborn it has been found associated with delayed coagulation time and delayed bleeding time in most cases; therefore, we will have to record a considerable proportion of these hemorrhages as not purely obstetrical but associated with certain underlying blood conditions which can be readily corrected by appropriate therapy.

DR. RUDOLPH W. HOLMES, CHICAGO (closing on his part).—The one great thing that I tried to picture in my paper was that modern obstetrics has not produced the diminution of maternal and fetal mortalities which was promised; that I felt the recent tendency of considering all pregnant women in a pathologic state, necessitating radical intervention, contributed to our failure. Further the oft repeated statement that "this paper is prepared for the purpose of presenting a new operation for specialists," is far from the mark; any physician has the right under the law and his conscience to attempt it. As a result, too often an unwise recommendation is promiscuously accepted. All the cults of modern obstetrics have their adherents: what one man may accomplish by exceptional skill is more than offset by those who fail in a refined technic and dexterity. The modern general trend in operative obstetrics has not benefited the woman or the unborn child. It is time that what is privately conceded to be the fact should be publicly decried.

I regret that I have stultified Dr. De Lee's intelligence by my statistics, but death is the completion of all things for the individual; the concrete evidence that the percentage mortality in hospital now is directly comparable to a hundred years ago deals with plain facts.

If Dr. Harris does not like my figures he must go to Julius Levy of the Infant Welfare Department of his own state, for he made the investigation concerning the

Digitized by Google

midwife practice of Newark. I know the fallacy of figures, but if we concede the old statistics quoted were wrong then we must concede the recent figures are wrong; if one is right we have equal justification in accepting the others.

I stand back of what I have written; I am merely opening the trail so that others may pave the way, that we may have conservation of mother and child which is to be attained, not by operative intervention routinely, but by truly scientific investigation into the causes of maternal and fetal deaths, and furnish an adequate preventive measure or measures. If all women having passed through a normal confinement were required to have gynecic operative repair to correct the injuries of labor, then it would be a timely thing to devise routine operative means to consummate delivery without those ravages. But so long as it is merely the incidental woman who demands operative correction of traumatism of birth a routine obstetric operation of some sort or another is a great mistake, and does not correct or mitigate the many evils of labor—on the contrary, unwise intervention increases the risks.

As I see it, the progress of the future in obstetrics is coming from the development of knowledge of antenatal pathology, the correction of diseased states in the fetus by scientific prenatal care and therapy. Who knows but that a refined gestational care may eliminate pelvic deformities in the fetus so that the future woman will be born with normal pelvic structure, and therefore will mature anatomically and obstetrically perfect. Endocrine pathology is of moment in obstetrics today; the future will show that internal secretions have an enormous import in the normal physiologic maturation of the fetus; disturbed, they abound with possibilities in the causation of what kills so many infants, "congenital weakness."

For many months I have asked each and every pregnant woman who came to me how many of her friends prevented conception from fear of labor, and one only had a friend who inhibited the possibility of a family on this ground. Selfishness and economic problems are more important in this connection than any assumed fear.

DR. JOHN O. POLAK, Brooklyn, New York (closing).—My paper has brought out the discussion I had hoped for, and apparently all of us are absolutely agreed, but, it seems to me, we are looking at this matter from different angles. We are specialists. Therefore, we can give these women something that the general practitioner cannot give them, and we do it, but we have no right to teach our students in the face of such statistics as have been brought forward resulting from the plan of aseptic expectancy, and interfering only where there are definite indications, that De Lee's method or Potter's method or anybody else's method is the thing to do. We have no facilities in any medical school in this country to teach that sort of obstetrics.

I have the highest regard for Dr. Potter and his work. I have seen his work and am familiar with it. I have learned to do version better by reading what he has written and seeing him do it. He has included in his method everything that is worth while in version, but it is going to do harm and cost numberless babies' lives if we as a Society say this is the plan to teach our students.

I will answer the doctor's question by saying no, my statistics are taken from the cases as they come to us in the clinic where they have had thorough prenatal work. My private operative incidence is very much larger than that reported, for not only are the majority of my cases pathologic, but I am doing what Dr. De Lee and Dr. Potter are doing, I am endeavoring to give every woman the benefit of a relatively painless labor in the hands of a specialist by individualizing the cases.

Digitized by Google

BASAL METABOLISM IN PREGNANCY AND THE PUERPERIUM

By Joseph L. Baer, M.D. (By Invitation)
Chicago, Ill.

THIS study comprises a series of basal metabolism readings in normal women in pregnancy and the puerperium, an attempt at interpretation of the results, and some interesting pathologic cases.

While the literature on the general subject has become quite voluminous, very little has been published that bears on the subject matter of this paper.

The experimental work of Warburg on the respiratory exchange in sea-urchins' eggs showed that the oxygen absorption of the unfertilized ovum is about 500 times that of the sperm cell of the same species. But when the two cells unite in the act of fertilization, the oxygen absorption goes up to about 3500 times that of the sperm. It is safe to say that something like this occurs in the mammalian ovum upon fertilization. The energy metabolism of a mammalian ovum cannot, however, be studied at an early stage, and it is not until well beyond the middle of pregnancy that the respiratory exchange of the fetus is large enough to be measured by existing means.

Murlin investigated what kinds of material are oxidized to furnish the energy in the fetus and new-born and also how much energy is thus set free in the pregnant woman and new-born child in comparison with the adult?

Several observers had noted a rising respiratory quotient during pregnancy in both lower animals and the human subject and there is no doubt from the observations of Carpenter and Murlin, and Hasselbalch that the respiratory quotient is higher just before parturition than just after, but they are not certain to what extent the limited diet usually allowed the mother in the days immediately following delivery is responsible.

Magnus-Levy seems to have made the first observations ever recorded on the energy metabolism of the pregnant woman and he noted an increase in oxygen absorption from 2.8 c.c. per kilogram per minute in the third month to 3.3 c.c. in the eighth, a rise of 17 per cent.

In the woman pregnant with a single fetus the observations of Zuntz, Carpenter and Murlin, and Hasselbalch agree in showing an extra metabolism near term of about 4 per cent over that of the same woman or other women in complete sexual rest. All these authors surmise that

Digitized by Google

this is scarcely more than may be accounted for by the increased respiratory activity necessary to preserve the hydrogen-ion concentration of the mother's blood.

Carpenter and Murlin made observations in three cases of human pregnancy at the Nutritional Laboratory in Boston. Two primiparae and one multipara were observed in the bed calorimeter for some weeks previous to parturition and mother and child were placed together in the calorimeter as soon thereafter as possible.

In two of the cases the comparison of antepartum and postpartum metabolism of mother and offspring together showed a difference of less than 1 per cent. The other case showed a difference of 7 per cent. The authors say that the curve of total energy metabolism of the mother and offspring suffered no deflection at parturition. The demands on the mother's digestive system are not greater. She is called upon to supply the same amount of energy in potential form to herself and child immediately after parturition that she did to herself and child immediately before it.

The rate of oxidation or heat production per unit of weight for the puerperal woman in these cases was 11 per cent higher than the average for 8 nonpregnant women and 7 per cent higher than that of the same subject just before delivery, the difference being ascribed partly to the increased activity of the mammary glands and in part to the stimulating effects of the products of involution.

Snell, Ford, and Rowntree have recently shown that menstruation affects the basal metabolism rate in women in health and disease. A rather constant rise occurs during menstruation or in the premenstrual period, this rise being followed by a postmenstrual fall.

Basal metabolism may be defined as the measure of the energy metabolism of a normal subject at complete rest and in the postabsorptive state. It is determined by ascertaining the heat production or gaseous interchange in such a subject during a certain period and may be expressed in calories per kilogram of weight of the subject. The earlier investigations of Du Bois and others in a few carefully studied cases of thyroid disease revealed the possibility of utilizing the basal metabolic rate as a method of clinical investigation.

The clinical study of basal metabolism may be by one of two methods: By direct or by indirect calorimetry. The calorimeter itself may be either a chamber calorimeter in which the subject is placed and breathes freely, or it may be a calorimeter of the nose-breathing or the mouth-breathing type in which the inspired and expired air and gases are mechanically separated.

Direct calorimetry depends upon the direct measurement of the heat of radiation, conduction and vaporization. Indirect calorimetry

Digitized by Google

depends upon the measurement of oxygen consumption with or without measurement of CO_2 production.

Determinations based solely on O_2 consumption are generally accepted by Benedict and others.

For this work, which was begun a year ago, it was found essential to have a light, portable, bedside apparatus. The Jones machine was considered, and after checking it against the results obtained with the available Benedict apparatus it was found entirely satisfactory, and thereafter was used throughout the series.*

Early in the work certain practical difficulties appeared. The cases were obtained from among the women of the Michael Reese Maternity prenatal clinic. Attempts to have the women prepare themselves by fasting overnight at home and then coming to the maternity for a 30 minute rest period soon proved impracticable, as the women frequently broke their fast, or complained because of the long street car ride before breakfast, and the plan was then altered to admit these women to the maternity on the previous day, putting them at rest and having them under proper conditions. Many women, having been subjected to first readings and being out-patients not under complete control, failed to return for subsequent readings until they went into labor. Some of the women could not be made to cooperate in spite of repeated trials and had to be dropped from the series. Pathologic conditions developing in pregnancy and the puerperium barred still others. As a result of these difficulties the number of properly completed cases, that is, successive readings on the same patient, dwindled from 105 to 44, on which these results are based.

Patients were given the usual preparation which included a light evening meal, thereafter only water until midnight, then nothing by mouth until the morning test was completed, no enema, no cathartics, and 30 minutes of absolute rest in bed and quiet before the readings were begun. These were taken between 8 and 10 A.M. In each case if two consecutive readings came within .1 minute, a third was not deemed necessary for that observation.

The charts shown extend from the thirty-fourth week of pregnancy to the 10th day of the puerperium. Readings earlier in pregnancy were insufficient in this series to warrant reaching an average. It may be stated that such rates as were obtained in the early weeks showed little or no increase above the normal.

The curve shows a gradual rise from +26 in the thirty-fourth week

*A personal communication from Professor A. J. Carlson, Head of Department of Physiology, University of Chicago, as to the clinical accuracy of the Jones metabolimeter reads as follows:

"My dear Dr. Baer: Referring to your letter of the 6th, and our telephone conversation of a week ago, I wish to say that we have made a number of check tests on the Benedict Portable Calorimeter, and the Jones Metabolimeter. In our experience the Jones apparatus checks with the Benedict within 2 per cent, that is to say, as closely as the Benedict apparatus checks against itself on a series of tests on the same person during any continuous period of observation."

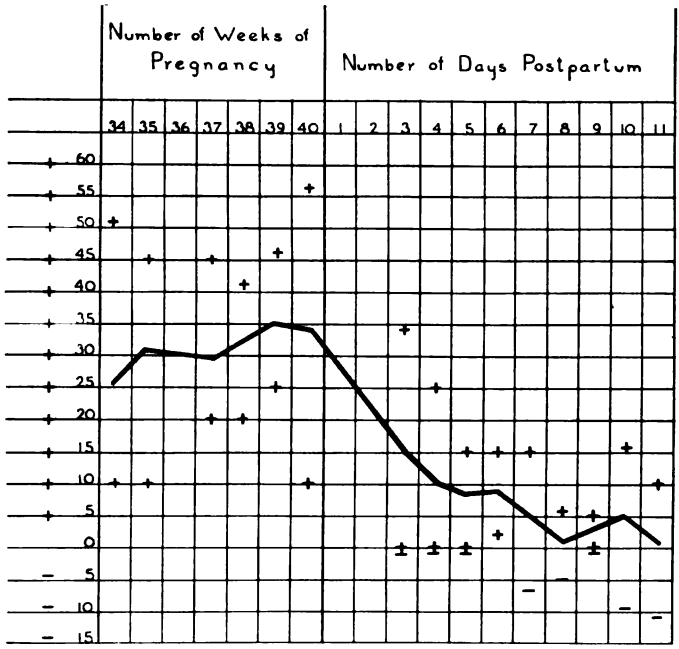
Digitized by Google

to + 33 in the fortieth week, a moderate drop to + 15 on the third day postpartum and a fall to + 5 by the seventh day and normal by the eleventh day. The highest and lowest readings show somewhat less accurately a similar rise and fall.

The second chart gives the figures from which the curve was constructed.

The ages ranged from eighteen to forty-two years. There were 18 primiparae and 26 multiparae ranging from para ii to para vii. No distinction as to metabolic rate values could be drawn on this basis, but in the continuance of the work, patients are being limited chiefly

CHART I



to the primiparae as they are more willing to remain overnight in the maternity than the mothers.

It was intended to admit only healthy women to the series. However, 2 cases of thyroid involvement were included in the series. Cases 78 and 79 showed a symmetrical enlargement without symptoms, were below the series average in metabolic rate, and had the characteristic drop of the puerperium. If thyroid enlargement in pregnancy is primarily compensatory in nature, the results obtained in these two cases may be accepted as further evidence of that concept. Five cases of toxemia of pregnancy associated with increased blood pressure and urinary findings of mild degree developed in the series, Nos. 19, 26, 34, 47, 57, and were not considered, but in only 2 instances did these

Digitized by Google

vary from the general averages obtained. No. 14 was a para iv with marked acidosis who gave birth to twins one of which died. The second, No. 26, a para i had a blood pressure of 158 systolic, albumin ++, was a low forceps, and had fever from the third to the tenth day of the puerperium. Her rates were +45 in the thirty-fifth week, +35 in the thirty-seventh week, +18 on the third day of the puerperium, and +11 on the tenth day of the puerperium. Three cases of pyelitis, Nos. 16,

CHART II

LENGTH OF PREGNANCY	NUMBER OF PATIENTS	HIGHEST RATE	LOWEST RATE	AVERAGE OF ALL READINGS
34th Week	8	+53	+10	+26
35th "	4	+45	+10	+31
36th "				
37th "	11	+45	+20	+29
38th "	6	+42	+20	+33
39th "	12	+46	+25	+35
40th "	11	+57	+10	+33
1st Day postpartum				
2nd " " "				
3rd " " "	14	+34	0	+15
4th " " "	13	+25	0	+11
5th " " "	4	+15	0	+ 8
6th " " "	3	+15	+ 3	+ 9
7th " " "	4	+15	− 7	+ 5
8th " " "	3	+ 6	− 5	+ 2
9th " " "	3	+ 5	0	+ 3
10th " " "	17	+17	− 8	+ 5.8
11th " " "	14	+10	−12	+ 1.4

Figures from which curve in Chart I was constructed.

45, and 62, one of which (62) likewise had a low grade puerperal infection, showed no great variation from the average findings. Eight cases developed fever in the puerperium, No. 9, bronchitis, No. 11, mild puerperal infection, Nos. 16 and 45, pyelitis, No. 48—100.8 on the seventh day; No. 62, pyelitis and puerperal infection; No. 65, abdominal pain and 101 on the eighth day. In none of these cases were readings taken until after 24 hours of normal temperature, and all

Digitized by Google

except No. 62 conformed generally to the normal averages. Her rates were + 55 in the thirty-seventh week, + 45 in the thirty-ninth week, + 25 on the fourth day of the puerperium and + 17 on the tenth day.

The obstetrical pathology included one transverse presentation, two cases of twins, two cases of breech presentation, and two microcephalic monsters. Labor was spontaneous in all cases excepting two low forceps, one mid-forceps, two cases of version and extraction and two cases of induction of labor—one by means of castor oil, quinine and separation of the membranes; the other by the introduction of the Voorhees bag. The average loss of weight of the cases seen in the thirty-ninth and fortieth week, and again on the third day postpartum was 7.257 kilograms; of this loss the average weight of the babies in this group was 3342 grams; the average weight of the placentas was 813 grams, a combined average per mother of 4155 grams of rapidly growing tissues. If the increased metabolic rates in late pregnancy found in this work are confirmed by others a possible explanation may lie in the presence within the maternal organism of these young and rapidly growing tissues with a high energy production and utilization.

The incomplete return to normal rates in the early days of the puerperium may be due to the presence of the large uterine mass undergoing absorption, and to the beginning of lactation.

Separating the babies according to sex gave in the thirty-ninth and fortieth week group an average rate for the mothers bearing male fetuses of + 37, and of those bearing female fetuses of + 34. Fetal sex in other words seems to play no rôle. This is in conformity with the results obtained by Talbot in his exceedingly careful and comprehensive work covering studies of children from birth to adolescence. He found the curves identical in the two sexes until a weight of 8 kilograms was reached, at which point, and up to 31 kilograms, the rate for boys distinctly exceeded that for girls.

Pulse rates were recorded for every observation made. No case with tachycardia was admitted to the series. Thirty-eight observations ranged between 80 and 90 in late pregnancy, while in the puerperium 14 ranged between 60 and 70, 14 between 70 and 80, and 22 between 80 and 90.

Several other cases not included in the series deserve special mention. Through the courtesy of Dr. L. E. Frankenthal, Case 8, a para ii, aged thirty-four, on whom he had made a diagnosis of macerated fetus, was seen in about the thirty-sixth week of pregnancy. At this time she complained of headache, but had no other symptoms. Blood pressure: systolic, 132; diastolic, 88. Urinary findings negative. Her reading was +10, confirmed by Dr. Harrie Jones, who did not know of the suspected dead fetus. Shortly thereafter she went into spontaneous labor, was delivered of a 46 cm. macerated fetus, and her reading on the sixth day of the puerperium was +8.

CASE 17. A para xi, aged 41, with a very large nodular thyroid without subjective symptoms gave the following readings: 39th week, +65, pulse 72. 40th

Digitized by Google

week, +65, pulse 84. Spontaneous delivery in 10 hours; and on the third day of the puerperium the reading was +37, pulse 84; on the 10th day, +22, pulse 80. If this case be considered a mild thyroid toxicosis and 20 points be deducted from all readings her curve would agree fairly well with the curve of the normal series.

CASES 12 and 14: Twins. The former showed pregnancy readings of +33 in the thirty-seventh week and +50 in the 39th week, the weight of the babies was 1270 gm. (female) who survived and 1700 gm. (male) who died 5 hours postpartum. The latter was a toxemia with acidosis mentioned elsewhere whose rates were +48 in the thirty-eighth week and +67 in the fortieth week and whose babies weighed 2890 (male) living and 1410 (female) microcephalic died in 12 hours.

SUMMARY OF RESULTS

1. The basal metabolic rate in 44 normal cases in late pregnancy averages 33 to 35 per cent above the normal for nonpregnant women of a surface area equal to the pregnant woman.

2. Three days after delivery the average basal metabolic rate is only 15 per cent above normal.

3. Seven to ten days postpartum the average basal metabolic rate is approximately normal.

4. Death of the fetus in late pregnancy is detectable in a woman otherwise normal by a drop in the basal metabolic rate compared with the average in this series.

CONCLUSIONS

The following conclusions seem justified:

1. The increased basal metabolic rate in late pregnancy is due to the growing demands of the fetal organism and placenta.

2. The incomplete or delayed return to normal is due to involution of the uterus and the onset of lactation.

3. Twin pregnancy should show a rate above the average for single pregnancy when both twins are well developed.

4. Thyroid enlargement may occur in pregnancy without increasing the basal metabolic rate above the averages obtained in this series.

5. Differential diagnosis between uterine tumor and pregnancy will not be helped unless greater refinements in method show increased rates much earlier than in this series. The x-ray can be called on as early as the fifth month and with reasonable certainty in the sixth month.

REFERENCES

Benedict: Jour. Biolog. Chem., 1915, xx, 263. Boston Med. and Surg. Jour., 1915, clxxiv, 857; ibid., 1918, clxxviii, 667; ibid., 1919, clxxxi, 107. *Benedict and Collins*: Boston Med. and Surg. Jour., 1920, clxxxiii, 499. *Benedict and Tompkins*: Boston Med. and Surg. Jour., 1916, clxxiv, 857. *Boothby*: Jour. Am. Med. Assn., 1920, lxxiv, 1600; Boston Med. and Surg. Jour., 1916, clxxv, 564. *Carpenter and Murlin*: Arch. Int. Med., 1911, vii, 184. *Du Bois*: Med. Clin. North America, 1919, ii, 1201. *Du Bois, D., and Du Bois, E. F.*: Arch. Int. Med., 1916, xvii, 863. *DuBois* and Others: Arch. Int. Med., 1916, xvii, 915. *Gephart and DuBois*: Arch. Int. Med., 1916, xvii, 902. *Hasselbalch*: Skan. Arch. f. Physiol., 1912, xxvii,

Digitized by Google

1. *Jones*: Jour. Am. Med., Assn., 1920, lxxv, 538. *Magnus-Levy*: Berl. klin. Wchnschr., 1895, xxxii, 650. *McCaskey*: Jour. Am. Med. Assn., 1920, lxxiv, 927. *Means and Aub*: Jour. Am. Med. Assn., 1917, lxix, 33; Arch. Int. Med., 1919, xxiv, 645. *Means and Woodwell*: Arch. Int. Med., 1921, xxvii, 608. *Murlin*: Am. Jour. Obst., 1917, lxxv, 913. *Snell, Ford, and Rowntree*: Jour. Am. Med. Assn., 1920, lxxv, 515. *Tissot*: Jour. de physiol. et de path. gen., 1904, vi, 688. *Warburg*: Pflüger's Arch. 1915, clx, 324. *Zuntz*: Arch. f. Gynäk., 1910, xc, 452.

DISCUSSION

DR. J. C. AUB, BOSTON (by invitation).—This paper has interested me for its conservative conclusions. I believe that the rise in metabolism is due to two causes. First, the increased amount of tissue metabolized, and second, the possibility that the internal secretions are abnormal in pregnancy. The work of Dr. Murlin has suggested that the rate of metabolism is the same as it is normally. Some of the higher results in the last months of pregnancy, as shown by Dr. Baer, might be interpreted in two ways: First, either the increased metabolism is due to the rapidly metabolizing tissue foods and other products, and second, it may be due possibly to a varying quantity of the internal secretions. The normal basal metabolic rate is quite constant in each individual and varies under the conditions stated by Dr. Baer. There is very little difference unless changes occur in the internal secretions. In the first place, the thyroid increases it markedly. In the second place, changes in the pituitary may increase it to a certain extent, as shown by removal of the pituitary. Following removal there is a drop in metabolism, and, where the pituitary is acting at too great a rate, there is a slight rise. Recently it has been found that the adrenals are also involved, and as the adrenals undergo a change in pregnancy, one might assume the possibility that there might be a change in the rate through the adrenal secretion. However, one must be cautious in interpreting such results as due to the internal secretions, and Dr. Baer's attitude in interpreting them as due primarily to the increased amount of and the rapidly metabolizing tissue, such as foods must be, seems extremely wise.

DR. EDWARD P. DAVIS, PHILADELPHIA.—These very interesting observations recall the early and, I think, adequate explanation for the pernicious nausea of early pregnancy, namely that it is due to excessive development of the syncytium. The statement has been made in this paper and in the discussion that the excessive metabolic activity is due to the fetus, and that persists in pregnancy. The thyroid is enlarged during pregnancy without detriment. We may correlate these observations in our study of toxemia. It has been shown that maceration of the fetus is followed by a drop in the toxic process, and if the patient gets better in a short time the fetus is likely to, and it usually does, die.

Furthermore, I would like to call attention to the extraordinary results of the recent European war. We are now in possession of the statistics of France and Germany. Eclampsia and toxemia decreased very largely in Germany during the war, in spite of the privations of the population, and this can be accounted for in this way: First, the privations were not as bad as supposed, and second, in many instances the metabolism of woman is extraordinary under very adverse circumstances. There is a common belief that under the stress of war or any calamity the normal relation between the sexes in the fetus would be reversed. The old tradition that there is an increased birth rate of boys in war times has been shown not to be the case at all. In those countries devastated by war the sex relations remain absolutely normal.

DR. COLLIN FOULKROD, PHILADELPHIA.—The literature on metabolism has increased and is increasing rapidly, and I should like to point out the fact that

Digitized by Google

there is one phase of study of this subject that will not only give us light, as Dr. Davis suggested, on the toxemia of pregnancy, but on the food needed by the pregnant woman. We have never had a definite method of recording the metabolism of the pregnant woman, in order to know what type of diet will satisfy her needs.

In a recent issue of the Journal of the American Medical Association, in an editorial reviewing diet in pregnancy, the conclusions drawn are indefinite. I would urge individual studies with particular reference to the nitrogenous elements, creatinin and others, as causes of the toxemia of pregnancy. Toxemia may be due to a loss of enzymic action on part of the mother in protecting herself against enlargement of the uterine muscle. It may possibly be proved that the pregnant woman lacks sufficient enzymes to digest some particular food and hence to protect herself. We may then find out what food is needed to prevent toxemia.

DR. BAER, CHICAGO (closing).—I have nothing further to add, except to point out the fact that until greater accuracy is obtained both in the apparatus used and in methods of interpretation, we are not going to be able to do the class of work the last speaker has hinted at. At present, we have to allow a leeway of plus or minus 10 in rating our cases. I have used the Dubois-Aub table. There are two other methods of expression extant, the authors of which claim that their method is superior to the Dubois-Aub, or the Harris-Benedict prediction tables, and the Dreyer formula.

In an article that has just appeared in the *Archives of Internal Medicine,* in the May issue, Means and Woodwell have analyzed these three methods of expression and find they so closely approximate each other that they recommend the continuance of the Dubois-Aub formula since this is the one most generally in use.

Digitized by Google

A COMPARISON BY STATISTICAL METHODS OF CERTAIN EXTERNAL PELVIC MEASUREMENTS OF FRENCH AND AMERICAN WOMEN

By Fred L. Adair, M.D.
Minneapolis, Minn.

I. INTRODUCTION

THE value of external pelvimetry is now generally admitted to be of little consequence for the determination of the actual size of the parturient canal. But it is conceded by many that it has distinct value as a routine obstetric procedure in the determination of the type of pelvis and the detection of variations from the norm. It is quite common to use the measurements made in one country as criteria for conclusions and the determination of procedures in other countries. It seemed to the author that it might be of interest and of some value (1) to apply some mathematical and statistical methods to the study of external pelvic measurements; (2) to compare a series of measurements of French women with a similar series of measurements of American women which were made by the same individual, thus reducing the personal equation to the minimum; (3) to draw, if possible, some conclusion regarding the determination of the norm of the obstetric pelvis as shown by external measurements, and to point out any national differences or similarities which might occur.

II. LITERATURE

The Present Status of Pelvimetry.—Ehrenfest (1906) thinks that only three measurements can be made with any degree of accuracy, namely, the true conjugate, and the anteroposterior and transverse diameters of the outlet. He believes that the external measurements cannot be made within 0.5 to 1 centimeter of accuracy. The original purpose of external pelvimetry, as suggested by Baudelocque, is now generally recognized as fallacious in that external pelvimetry is useless for the determination of the internal measurements of the pelvis. He believes, however, that it is valuable for the determination of the form of the pelvis.

Cragin (1916), in reference to the value of external pelvimetry, states "It is well known that pelvimetry, and especially external pelvimetry, cannot be depended upon alone * * * external pelvimetry has value, however, and often great value in the diagnosis of abnormal pelves * * * while the interspinous and intercristal diameters by themselves are often of little value, the relative measurements are of

Digitized by Google

great value in diagnosis * * * the external conjugate varies greatly in size in different individuals and often gives little information of value."

Huntington (1917) considers that five pelvic measurements have proved to be of practical value, namely, the intercristal, interspinous, external conjugate, diagonal conjugate, and true conjugate. He quotes the following average measurements as given by the various authors. Ahlfeld—external conjugate 19.5 to 20, interspinous 24, intercristal 28; Bumm—external conjugate 18 to 20, interspinous 26, intercristal 29; Jellett—external conjugate 20, interspinous 26.5, intercristal 28 to 29; Cragin—external conjugate 20, interspinous 26, intercristal 28; Williams—external conjugate 21, interspinous 26, intercristal 29. The Boston Lying-in Hospital gives the following average measurements: external conjugate 20.7, interspinous 24.4, intercristal 28.2. The author states that in the outpatient department of the Boston Lying-in Hospital in 918 cases, about 47 per cent had measurements less than 19, 24, and 27.

Bourne (1919) emphasizes the importance of external pelvic measurements as a part of antenatal examination. He considers that the external conjugate is of considerable importance. He makes the measurement from the depression below the tip of the last lumbar spine to the *inner surface* of the upper border of the symphysis pubes. He finds this measurement to be about 18.5 centimeters. He considers the average of 25 centimeters which is usually given for the interspinous as too high. In his experience it ranges from 21 to 25, usually about 22.5 centimeters. The intercristal measurement varies in his experience from 26 to 27.5 centimeters.

Williams (1919) considers that external pelvic measurements are of considerable value. He believes that while they give no accurate information as to the actual size of the parturient canal, certain general conclusions may be drawn as to the size and variation of the pelvis. He thinks that four external measurements, not considering those of the outlet, are of value, namely, the interspinous, intercristal, intertrochanteric, and the external conjugate. He gives the average normal measurements in the living woman as 26, 29, 32, and 21, respectively. He thinks that the normal difference between the interspinous and the intercristal is about 2.5 to 3 centimeters.

RACIAL COMPARISON

Riggs (1904) examined 1500 cases, 779 white and 721 negro. He considered the cases from the standpoint of race, dividing the pelves into normal, generally contracted, simple flat and rachitic. The average measurements for the normal white pelvis as given by him are: external conjugate 19.71; interspinous 25.47; intercristal 27.99; in-

Digitized by Google

tertrochanteric 30.9. For the normal negro pelvis he gives as the average measurements: external conjugate 19.32; interspinous 23.99; intercristal 26; intertrochanteric 30.09. His comparison of the pelves of the two races shows that those of the white women are lower and broader, while those of the negroes are more narrow and relatively deep, and that a much higher percentage of the negro pelves conform to the type known as generally contracted pelves.

Acosta-Sison and Calderon (1919) give comparative tables of average measurements based on data taken from the different authors and compare them with the pelves of the Filipinas of which they measured some 1200 cases. They measured these diameters from points corresponding to the inner and outer surfaces of the bone, using those taken from the outer surfaces for comparative purposes. They give the results of their examination and state that the type of the Filipina pelvis is different from that of the white American and of the negro. They state that the average normal measurements are similar to the generally contracted pelves of the white American. They plotted curves of some of these measurements of which we will mention only three, namely, the external conjugate, interspinous, and intercristal. The curves are plotted on pelvic measurements down to one-tenth of one centimeter. Based on these rather minute pelvic measurements, the authors thought they could isolate three major and two minor types of Filipina pelves. They thought that the different types might indicate a mixture of the various Philippine peoples. As will be referred to later, these curves have been reduced as accurately as possible to terms of the grosser measurements which the author has used in his series so that the types of curves could be better compared with his own measurements.

From the literature it is apparent that most authors consider the length of the different measurements as of great importance when considered together, and the relationship of the different measurements to one another is thought to be of definite value. Van der Hoeven (1912) states that the difference between the interspinous and the intercristal measurements is generally considered to be about 3 centimeters. From his study and observations, he concludes that the difference between these two in normal and generally contracted pelves varies from 1.4 to 5 centimeters, while the difference between each one of the measurements and the one which is next larger is about 3 centimeters.

It is apparent from the literature that not a great deal of work has been done in the comparison of the pelves of different races and different nationalities. The most that has been done has been worked out by Williams and his associates in the comparison of the pelves of negroes with those of the white race.

Digitized by Google

Emmons (1913) studied museum specimens of the pelves of American Indians very carefully, but made only two external measurements which can be utilized in the present analysis.

Acosta-Sison and Calderon have studied the Filipina pelvis quite carefully and compared it with the pelves of the negro and the white American, using the data compiled by Williams and others. Most of these comparisons, with the exception of the work done by Acosta-Sison and Calderon, are based on the average, maximum and minimum measurements. Acosta-Sison and Calderon worked out some frequency curves which seem to give a false impression because they are based on too fine a measurement. It is impossible to make measurements of the human pelvis within one-tenth of a centimeter. The experience of the author coincides with most of the statements in the literature to the effect that these measurements cannot at the very best be made within one-half a centimeter of variation.

There is, of course, a mass of literature on contracted pelves, taking up all sorts of phases of the subject, which will be omitted, not being an integral part of this consideration, the primary object of which is simply to compare the routine measurements of different nationalities.

Emmons' average measurements for the interspinous and intercristal diameters have been mentioned above. He also worked out a standard deviation and a coefficient of deviation which will be considered later in the present paper. De Souza (1913) analyzed very carefully the work of Emmons and added some observations of his own. He worked out some formulæ for the different measurements which he thinks can be applied with considerable accuracy. The work of Emmons and De Souza was done on dried pelves, though the latter attempted to determine the amount of difference between dried and museum pelves and those in the living. They have not considered extensively the four external measurements which are frequently taken by obstetricians, and have dealt with only two of the external measurements, namely, the interspinous and the intercristal. In so far as these two measurements are concerned, the results will be compared with those of the author later in the discussion. These publications are of considerable importance because of the fact that they are practically the only ones which have analyzed pelvic measurements extensively by more recent mathematical and statistical methods.

The accompanying tables give the average measurements of the four diameters under consideration as quoted for the different races and nationalities by the various authors, including the article of Acosta-Sison and Calderon as well as various others cited in Tables X and XI.

III. MATERIAL

The material consisted of measurements of 329 to 350 French women and 320 American women. The former cases were observed by the

Digitized by Google

author during a short stay in Paris. They belonged to the working class, some of them to the better class of skilled workmen. They were all of the Caucasian race. The Americans all came from Minnesota, were of the white race and were practically all native born. To a considerable extent they were of mixed nationality, mostly from the middle class of professional and business people. There was a considerable percentage of Jewish people, and there were many showing Scandinavian ancestry. There was also a considerable number showing evidence of German, Irish, Scotch, French, and English extraction. Most of them date their ancestry back several generations in the United States.

IV. METHOD OF STUDY

The various measurements of these cases were tabulated and considered by mathematical and statistical methods which are beginning to be applied to medical and surgical subjects. The significance of the terms used and the methods of obtaining the mathematical results will be briefly stated. First, the arithmetical mean or average was obtained by methods very familiar to you all. The maximum and minimum measurements were, of course, easily obtained. The standard deviation was secured by noting the variation of the individual measurement of each case from the average and indicating by the plus or minus sign whether the deviation was greater or less than the average. These individual deviations were squared, the results added and the square root extracted. This result is what is known as the standard deviation and represents an amount of deviation slightly higher than the average.

The amount of probable error was determined by a standard formula which is as follows:

$$\text{Probable error} = \pm 0.6745 \times \frac{\text{standard deviation}}{\text{square root of number of cases.}}$$

This result indicates half the amount of variation plus or minus which may reasonably be expected to have occurred in the series of cases considered.

The coefficient of variability or deviation was determined by the following formula:

$$\text{Coefficient of variability} = \frac{\text{standard deviation}}{\text{average}} \times 100.$$

The result gives in percentage the deviation from the average measurement and is comparable to the standard deviation, the former giving the absolute variation from the average, the latter the percentage variation. It shows the percentage of variability from the arithmetical average.

Digitized by Google

TABLE I
PELVIC DIMENSIONS—AMERICAN

(I) EXTERNAL CONJUGATE					(II) INTERSPINOUS		
LENGTH	NO. CASES	PERCENT TOT. NO.	CUMULATIVE I PERCENTAGE II		LENGTH	NO. CASES	PERCENT TOT. NO.
17	4	1.20	1.20	.93	20	3	.94
18	24	7.50	8.70	2.84	21	6	1.90
19	65	20.30	29.00	12.24	22	30	9.40
20	121	37.80	66.80	26.64	23	45	14.40
21	64	20.00	86.80	43.14	24	53	16.50
22	35	10.90	97.70	65.34	25	71	22.20
23	6	1.80	99.50	81.84	26	53	16.50
24	1	0.31	99.81	93.94	27	39	12.10
				99.54	28	18	5.60
				100.16	29	2	.62
Totals	320	99.81	99.81	100.16		320	100.16

(III) INTERCRISTAL					(IV) INTERTROCHANTERIC		
LENGTH	NO. CASES	PERCENT TOT. NO.	CUMULATIVE III PERCENTAGE IV		LENGTH	NO. CASES	PERCENT TOT. NO.
24	1	.30	.30	.94	28	3	.94
25	15	4.70	5.00	4.64	29	12	3.70
26	26	8.10	13.10	17.74	30	42	13.10
27	73	22.80	35.90	38.04	31	65	20.30
28	77	24.10	60.00	65.14	32	87	27.10
29	74	23.10	83.10	81.64	33	53	16.50
30	38	11.90	95.00	90.94	34	30	9.30
31	9	2.80	97.80	95.94	35	16	5.00
32	7	2.20	100.00	98.44	36	8	2.50
				99.37	37	3	.93
				99.68	38	1	.31
Totals	320	100.00	100.00	99.68		320	99.68

The coefficient of correlation is determined in a more elaborate manner and represents a comparison of each of the different measurements in pairs. This is accomplished by multiplying together the deviations of each case in the series to be compared. These will fall into two groups of plus and minus. The groups are added separately and the lesser subtracted from the greater (A). This may show a positive or negative correlation, positive meaning that the measurements are correlated in the same direction, negative meaning that they are correlated in opposite directions. The standard deviation of the one group is multiplied by that of the other group. The result is then multiplied by the number of cases in the series (B). The first sum mentioned above (A) is divided by the product (B) and the result represents the coefficient of correlation. One (1) represents perfect correlation, consequently the nearer the coefficient approaches one (1) the more perfect the correlation between the two sets of figures.

Digitized by Google

The probable error of the coefficient was also determined. The formula is as follows:

$$\text{Probable error} = \frac{\pm\, 0.6745\ (1 - \text{square of coefficient of correlation})}{\text{square root of the number of cases}}$$

The correlation of the different groups was shown by a method of tabulating the data which may require a word of explanation. The tables show the actual number of cases which occur with any measurements in the two series which one desires to compare. It also indicates which measurements in the two series have the largest relative number of cases. The tables also show the total number of cases in either series having a given measurement and the total number of cases in the series.

A general table giving the summary of the data for each measurement of both series was also included. Two other tables, one for each series, were included, giving the data for each individual measurement. The data in these tables served as a basis for working out the percentage curves which give in a graphic form the mathematical data shown in the tables. All curves are based on percentages instead of on the actual number of cases. Individual curves are shown for each measurement of each series. The corresponding curves of each measurement are also superimposed to show more graphically the relationships of the measurements of each series.

V. ANALYSIS OF MATERIAL

Table I is an analysis of the four external pelvic measurements or dimensions of American women. In this table, as in all others, the measurements are designated in centimeters. The number of cases for each measurement is indicated and the percentage of cases with this measurement is shown. The cumulative percentage for each measurement is determined by adding the percentage of each measurement to the total percentage of the shorter measurements. In the totals, the number of cases and the total percentage are shown. This table serves as a basis for working out two types of curves. The first (Figs. 1 and 2) is the percentage frequency curve which shows the percentage number of cases for each measurement. As will be seen from the accompanying figures, these curves rise rather rapidly to their peak and descend in rather a symmetrical manner to the base line. The significance of these curves will be considered later. The second curve based on the cumulative percentage (Figs. 3 and 4) shows the parallelism in percentage of the different measurements of each diameter.

Table II shows the same measurements made of French women. These two tables may be considered comparatively. Certain points are brought out in these tables which show themselves graphically in the corresponding curves. Each measurement will be considered sepa-

Digitized by Google

rately and then the measurements as a whole compared (Table III).

The external conjugate which is indicated by Roman numeral "I" throughout the discussion was measured 329 times in the French women and 320 times in the American. The maximum of this measurement is the same in both French and American and occurred with equal frequency in each group. The minimum measurement was lower in the French by 2 centimeters. The minimum American measurement

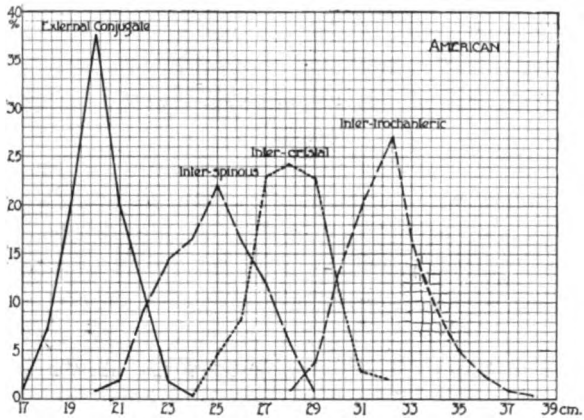


Fig. 1.—Percentage frequency graph. American women. Abscissa shows length of different measurements in centimeters. Ordinate shows their percentage frequency. This is true of all of the figures.

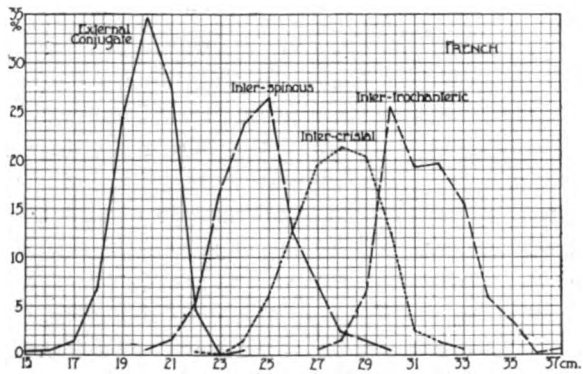


Fig. 2.—Percentage frequency graph. French women.

occurred with practically the same frequency in the French series. The average French measurement was slightly lower than the American by about one-third of a centimeter. For practical purposes they may be considered almost identical. The range of the measurements in the French was greater than in the American women. The preponderating measurement or mode (20 centimeters) occurred with greater percentage frequency in the American than in the French. This makes a little higher and a little sharper curve in the American cases. There

Digitized by Google

is a striking similarity between the American and the French graphs of this measurement. Both are of the same type and practically of the same symmetry. There is a tendency of the American curve to be slightly to the right, indicating a little larger dimension. These curves

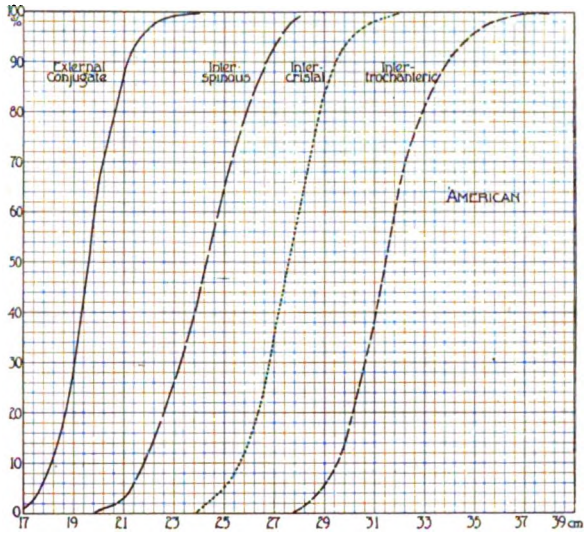


Fig. 3.—Cumulative percentage graph. American women.

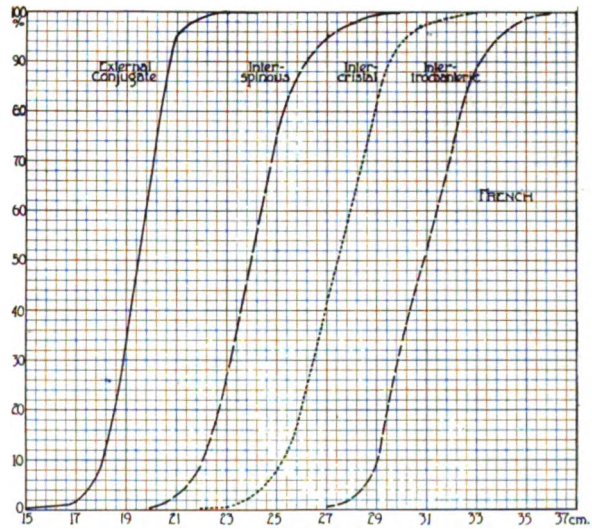


Fig. 4.—Cumulative percentage graph. French women.

are all plotted, as is apparent, with the centimeter measurement as the abscissa and the percentage as the ordinate.

The interspinous, indicated by Roman numeral "II," was measured 350 times in the French and 320 times in the American women. The maximum measurement was 30 in the French and 29 in the American.

Digitized by Google

TABLE II
PELVIC DIMENSIONS—FRENCH

(I) EXTERNAL CONJUGATE					(II) INTERSPINOUS		
LENGTH	NO. CASES	PERCENT. TOT. NO.	CUMULATIVE I PERCENTAGE II		LENGTH	NO. CASES	PERCENT. TOT. NO.
15	1	.30	.30	.57	20	2	.57
16	1	.30	.60	2.28	21	6	1.71
17	4	1.21	1.81	8.85	22	23	6.57
18	22	6.69	8.50	25.71	23	59	16.86
19	80	24.32	32.82	49.42	24	83	23.71
20	114	34.65	67.47	75.70	25	92	26.28
21	90	27.35	94.82	88.56	26	45	12.86
22	16	4.86	99.68	95.70	27	25	7.14
23	0	.00	99.68	97.98	28	8	2.28
24	1	.30	99.98	99.41	29	5	1.43
				99.98	30	2	.57
Totals	329	99.98	99.98	99.98		350	99.98

(III) INTERCRISTAL					(IV) INTERTROCHANTERIC		
LENGTH	NO. CASES	PERCENT. TOT. NO.	CUMULATIVE III PERCENTAGE IV		LENGTH	NO. CASES	PERCENT. TOT. NO.
22	1	.28	.28	.86	27	3	.86
23	0	.00	.00	2.58	28	6	1.72
24	6	1.71	1.99	8.88	29	22	6.30
25	21	6.00	7.99	34.38	30	89	25.50
26	46	13.14	21.13	53.58	31	67	19.20
27	68	19.43	40.56	73.35	32	69	19.77
28	74	21.14	61.70	89.11	33	55	15.76
29	72	20.57	82.27	95.13	34	21	6.02
30	44	12.57	94.84	98.85	35	13	3.72
31	10	2.86	97.70	99.14	36	1	.29
32	5	1.43	99.13	100.00	37	3	.86
33	3	.86	99.99				
Totals	350	99.99	99.99	100.00		349	100.00

The maximum American measurement occurred with less frequency in the American than in the French. The minimum measurement was the same in both series, occurring, however, with less frequency in the French. The average measurement or mean was nearly one-half centimeter greater in the American than in the French. The most frequent measurement or mode (25 centimeters) was the same in both series. It occurred with greater frequency, however, in the French women. This would make the French curve have a higher peak. Both curves were fairly similar, the American showing more symmetry than the French. The American curve was also slightly further to the right than the French, showing a somewhat larger measurement when taken as a whole. The French curve shows greater variability. The range in the French is somewhat greater on the side of the maximum measurement.

Digitized by Google

TABLE III

MEASUREMENTS	I EXTERNAL CONJUGATE			II INTERSPINOUS			III INTERCRISTAL			IV INTERTROCHANTERIC		
	LGT CM	CASES	%	LGT CM	CASES	%	LGT CM	CASES	%	LGT CM	CASES	%
Minimum												
American	17	4	1.2	20	3	0.94	24	1	0.3	28	3	0.94
French	15	1	0.3	20	2	0.57	22	1	0.28	27	3	0.86
Maximum												
American	24	1	0.3	29	2	0.62	32	7	2.2	38	1	0.31
	24	1	0.3	30	2	0.57	33	3	0.86	37	3	0.86
Average	CM			CM			CM			CM		
American	20.26			24.94			28.31			32.19		
French	19.94			24.55			27.82			31.41		
Probable Error	CM			CM			CM			CM		
American	±0.04			±0.07			±0.06			±0.06		
French	±0.04			±0.06			±0.06			±0.06		
Standard Deviation	CM			CM			CM			CM		
American	1.14			1.80			1.49			1.70		
French	1.12			1.65			1.74			1.72		
Coefficient of Variability												
American	5.6%			7.2%			5.2%			5.3%		
French	5.6%			6.7%			6.2%			5.5%		
Coefficient of Correlation	I & II		I & III		I & IV		II & III		II & IV		III & IV	
American	+0.31		+0.41		+0.56		+0.65		+0.46		+0.61	
French	+0.64		+0.67		+0.71		+0.85		+0.77		+0.79	
Probable Error of Coefficient of Correlation												
American	±.034		±.031		±.026		±.021		±.029		±.023	
French	±.022		±.020		±.018		±.010		±.014		±.013	

The intercristal, indicated by Roman numeral "III," was measured 350 times in the French and 320 times in the American women. The maximum measurement was greater in the French by 1 centimeter. The minimum measurement was less in the French by 2 centimeters. The minimum American measurement occurred with less frequency in the American than in the French. The maximum American measurement occurred with greater frequency in the American than in the French. The mode was the same for both and occurred in greater percentage in the American than in the French. The curves made for the two groups show a peculiar form of striking similarity, being unlike the curves of any of the other measurements. Both are fairly symmetrical. Both are definitely truncated, indicating a larger modal class. The American curve has a narrower base, being somewhat

Digitized by Google

TABLE IV
EXTERNAL CONJUGATE (I)

INTERSPINOUS (II) MEASUREMENT	15	16	17	18	19	20	21	22	23	24	NO. OF CASES
20					(1) 1	(1) 2					(2) 3
21			(2) 1		(1) 1	(2) 4	(1)				(6) 6
22			(1)	(1) 6	(10) 9	(6) 10	(3) 5				(21) 30
23		(1)	(1) 1	(5) 3	(23) 13	(17) 18	(11) 8	2			(58) 45
24	(1)			(9) 3	(18) 8	(32) 24	(23) 13	(2) 4	1		(82) 53
25			1	(3) 3	(23) 21	(35) 30	(19) 8	(9) 6	2		(89) 71
26			1	(3) 5	(6) 7	(12) 18	(21) 14	(2) 7	1		(44) 53
27				(1) 3	5	(9) 12	(8) 9	8	1	1	(18) 39
28				1	(1)	3	(3) 6	(1) 7	1		(5) 18
29							(1) 1	(2) 1		(1)	(4) 2
	(1)	(1)	(4) 4	(22) 24	(80) 65	(114) 121	(90) 64	(16) 35	(0) 6	(1) 1	(329) 320

Figures in circles—French.
Black—American.

narrower and higher. In the main, it is a trifle more to the right than the French curve, indicating a generally larger pelvis which is also indicated by the mean which is about one-half centimeter greater in the American than in the French. The range of the measurements is definitely greater in the French by 1 centimeter on the side of the maximum and 2 centimeters on that of the minimum measurement.

The intertrochanteric, indicated by Roman numeral "IV," was measured in 349 cases in the French and 320 cases in the American women. The maximum measurement is less in the French than in the American by 1 centimeter. The minimum is less in the French than in the American also by 1 centimeter. The maximum measurement of the French series occurs with practically the same frequency in the American. The minimum measurement of the American occurs with greater frequency in the French than in the American. The average measurement is greater in the American than in the French women by about three-fourths of a centimeter. The mode is 32 centimeters in the American and 30 centimeters in the French. Both graphs have a base

Digitized by Google

of practically the same dimensions. The American curve is quite symmetrical while that of the French shows a rather marked asymmetry or skewness. Both are of about the same height. The American graph as well as its apex is a little further to the right.

Table III is a summary of the data worked out for the different groups of cases. It shows the maximum and minimum measurements, the number of instances and the percentage with which each one of

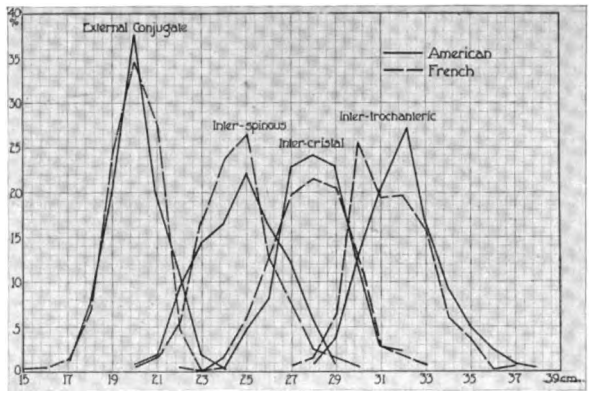


Fig. 5.—Comparison of pelves of French and American women. Percentage frequency graphs.

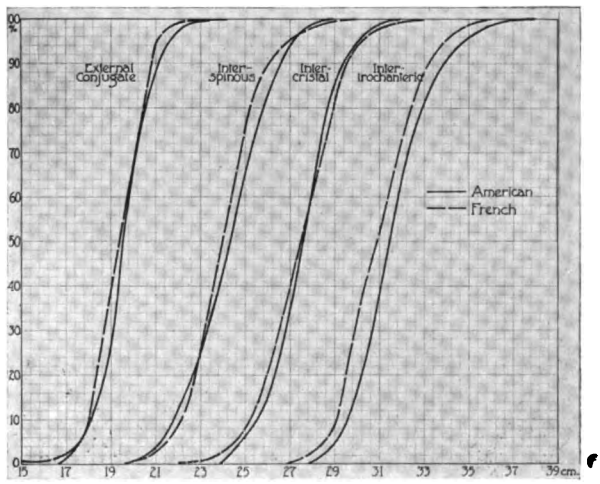


Fig. 6.—Comparison of pelves of French and American women. Cumulative percentage graphs.

these occurs in the different series. The average measurement is also shown for each group of cases. The probable error in centimeters for this measurement was worked out according to the formula given earlier in the paper. As will be seen, the probable error is very low.

The standard deviation was determined as already mentioned. The standard deviation for the external conjugate was slightly greater in the American than in the French. The deviation of this measurement

Digitized by Google

TABLE V
EXTERNAL CONJUGATE (I)

INTERCRISTAL (III) MEASUREMENT	15	16	17	18	19	20	21	22	23	24	NO. OF CASES
22					(1)						(1) 0
23											(0) 0
24			(3)		(2) 1	(1)					(6) 1
25			2	(1) 1	(9) 8	(6) 3	(3) 1				(19) 15
26	(1)	(1)	(1)	(8) 6	(16) 8	(13) 11	(6) 1				(46) 26
27				(7) 5	(21) 15	(26) 34	(12) 17	(2) 2			(68) 73
28			2	(4) 6	(21) 19	(27) 31	(18) 10	(3) 9	1		(73) 78
29				(1) 4	(7) 14	(22) 27	(26) 16	(1) 9	3		(67) 73
30				(1) 2	(3)	(8) 13	(20) 12	(8) 8	2	1	(40) 38
31						(1) 1	(4) 4	(1) 4			(6) 9
32						1	(1) 3	3		(1)	(2) 7
33								(1)			(1) 0
	(1) 0	(1) 0	(4) 4	(22) 24	(80) 65	(114) 121	(90) 64	(16) 35	(0) 6	(1) 1	(329) 320

Figures in circles—French.
Black—American.

in the two groups may be regarded as practically the same. The deviation of the interspinous measurement was somewhat greater in the American than in the French. The deviation of the intercristal was greater in the French women than in the American. The deviation of the intertrochanteric was practically the same for both French and American women. In both groups, the deviation from the average was the least for the external conjugate measurement. In the American, the intercristal was next in order showing the least deviation. Then followed the intertrochanteric, and the interspinous with the greatest deviation. In the French group, the interspinous was followed by the intertrochanteric and the intercristal in progressively greater deviations from the average.

The coefficient of variability was determined as stated above and

Digitized by Google

TABLE VI
EXTERNAL CONJUGATE (I)

INTERTROCHANTERIC (IV)	MEASUREMENTS	15	16	17	18	19	20	21	22	23	24	NO. OF CASES
	27			(1)		(1)		(1)				(3)
	28			(1)	1	(3)	(1) 2					(5) 3
	29			(1) 1	(8) 3	(8) 6	(2) 2	(2)	(1)			(22) 12
	30		(1)	(1)	(7) 9	(34) 13	(33) 16	(13) 4				(89) 42
	31	(1)		2	(3) 7	(20) 11	(28) 30	(14) 11	(1) 4			(67) 65
	32			1	(3) 1	(9) 24	(31) 38	(20) 18	(5) 5			(68) 87
	33				(1) 3	(4) 8	(16) 23	(28) 13	(3) 4	2		(51) 53
	34					2	(3) 6	(9) 12	(4) 8	2		(16) 30
	35					1	(1) 3	(3) 5	(2) 7		(1)	(7) 16
	36						1		5	1	1	(0) 8
	37							1	1	1		(0) 3
	38								1			0 1
		(1)	(1)	(4) 4	(22) 24	(79) 65	(114) 121	(90) 64	(16) 35	6	(1) 1	(328) 320

Figures in circles—French.
Black—American.

was fairly low. It was the same for the external conjugate in both French and American women and practically the same for the intertrochanteric, being slightly greater in the French series. The percentage variability for the interspinous was greater by about 0.5 per cent in the American than in the French women. The intercristal shows a greater percentage variability by about 1 per cent in the French than in the Americans.

The correlation was worked out for all possible combinations of two measurements in each of the two groups. One (1) represents perfect correlation. In every instance in these series, the correlation was positive. The correlation between the external conjugate and the interspinous measurements was much more marked in the French than in the American cases. This was also true for all other correlations in

Digitized by Google

TABLE VII
INTERSPINOUS (II)

INTERCRISTAL (III) MEASUREMENT	20	21	22	23	24	25	26	27	28	29	30	NO. OF CASES
22	(1)											(1) 0
23												(0) 0
24	1	(3)	(2)									(5) 1
25		(3) 2	(7) 5	(11) 5	1	2						(21) 15
26		3	(7) 9	(21) 12	(18) 1	(1) 1						(47) 26
27	2	1	(5) 10	(17) 18	(32) 19	(11) 15	(2) 7			1		(67) 73
28			(2) 4	(8) 9	(18) 20	(44) 30	(7) 10	(1) 4				(78) 77
29			(1) 2	(2) 1	(14) 9	(24) 18	(22) 28	(9) 15	1			(72) 74
30					(4) 3	(13) 4	(11) 7	(11) 16	(4) 8	(1)		(44) 38
31					(1)		(2) 1	(3) 1	(2) 6	(2) 1		(10) 9
32						1	(1)	(1) 3	(2) 3	(1)		(5) 7
33											2	2 0
	(1) 3	(6) 6	(24) 30	(59) 45	(82) 53	(93) 71	(45) 53	(25) 39	(8) 18	(4) 2	(2)	(349) 320

Figures in circles—French.
Black—American.

the two groups. In the American series, the highest correlation occurred between the interspinous and the intercristal, the lowest between the external conjugate and the interspinous. In the French, the highest correlation was also between the interspinous and the intercristal, and the lowest between the external conjugate and the interspinous. In general in both series, the correlations between the external conjugate and any other measurement were less than those of any of the other measurements.

The probable error of the coefficient of correlation was determined for each coefficient. It was greater in the American than in the French series, but was relatively small for all of the different correlations.

Tables IV to IX inclusive show in tabular form the correlation between every pair of measurements in the two series. The figures of

Digitized by Google

TABLE VIII
INTERSPINOUS (II)

INTERTROCHANTERIC (IV) / MEASUREMENTS	20	21	22	23	24	25	26	27	28	29	30	NO. OF CASES
27		(1)		(2)								(3) 0
28		(1)	(2) 1	(1) 1	(2)	1						(6) 3
29		(2) 2	(2) 5	(5) 2	(5)	(6) 3	(1)	(1)				(22) 12
30	(2) 2	(1) 2	(12) 3	(29) 9	(26) 9	(12) 8	(7) 8	1				(89) 42
31	1	(1) 1	(3) 9	(13) 12	(20) 9	(21) 18	(5) 10	(3) 5	(1)			(67) 65
32		1	(4) 7	(4) 13	(15) 17	(29) 21	(13) 17	(4) 9	2			(69) 87
33			4	(4) 6	(11) 11	(15) 9	(15) 8	(7) 9	(3) 5	1		(55) 53
34			1	2	(3) 5	(4) 6	(3) 7	(8) 6	(2) 3	(1)		(21) 30
35					2	(5) 4	(1) 2	4	(2) 3	(4) 1	(1)	(13) 16
36						1		4	3		(1)	(1) 8
37					(1)		1	(2) 1	1			(3) 3
38									1			(0) 1
	(2) 3	(6) 6	(23) 30	(58) 45	(83) 53	(92) 71	(45) 53	(26) 39	(8) 18	(5) 2	(2)	(349) 320

Figures in circles—French.
Black—American.

the American cases are shown in plain type, those of the French are shown in a circle. By these tables it is possible to tell the total number of cases in the series, the number of cases in either series having a given measurement, also the number of cases occurring with any pair of measurements in the correlated groups. These tables show a certain amount of positive correlation which is also indicated in the table by the coefficient of correlation. The amount of correlation for the different groups may be seen by the manner in which the bulk of the cases is grouped.

In general it may be said that the French pelves are smaller than the American. They show a greater range as between the maximum and minimum, while their average measurement is somewhat less.

Digitized by Google

TABLE IX
INTERCRISTAL (III)

INTERTROCHANTERIC (IV) MEASUREMENT	22	23	24	25	26	27	28	29	30	31	32	33	NO. OF CASES
27			(1)	(2)									(3) 0
28			(2)	(1)	(2) 2	(1) 1							(6) 3
29			(2)	(4) 6	(6) 4	(5) 2	(5)						(22) 12
30	(1)		(1) 1	(9) 1	(22) 10	(32) 15	(18) 6	(9) 8	1				(89) 42
31				(2) 3	(13) 4	(18) 24	(20) 24	(11) 9	(3) 1				(67) 65
32				(1) 5	(3) 3	(7) 24	(25) 26	(23) 23	(9) 6		(1)		(69) 87
33				(1)	3	(4) 5	(8) 15	(22) 18	(16) 12	(4)			(55) 53
34						2	4	(4) 9	(11) 10	(5) 3	(1) 2		(21) 30
35						(1)	(1) 2	(2) 5	(3) 3	(1) 3	(3) 3	(2)	(13) 16
36								2	3	2	1	(1)	(1) 8
37								(1)	(2) 1	1	1		(3) 3
38									1				(0) 1
	(1)		(6) 1	(20) 15	(46) 26	(68) 73	(74) 77	(72) 74	(44) 38	(10) 9	(5) 7	(3)	(349) 320

Figures in circles—French.
Black—American.

The deviation from the average is on the whole less in the French than in the American women. The variability of the different measurements in both the French and the American is remarkably close, being low in both groups.

The coefficient of correlation was much higher in the French than in the American. A comparison of these coefficients of variability and correlation with those of other anatomical measurements as determined by various authors shows the deviations to be relatively small and the correlations to be relatively high in most instances. The following data is taken from Davenport's Statistical Methods. Warren is quoted as giving the coefficient of variability of the limb bones of French and Naquada skeletons as 4.68 to 5.57 per cent; Rollet as stating that the coefficient of correlation between the right and left femur

Digitized by Google

TABLE X

AVERAGE PELVIC MEASUREMENTS OF THE LIVING SUBJECTS FOR THE VARIOUS RACES AND NATIONALITIES

	CAUCASIAN RACE						
	WHITE AMERICAN						
	GRANDIN AND JARMAN	CRAGIN	RIGGS	EDGAR	WILLIAMS	HUNTINGTON	ADAIR
Ext. conjugate	20	20	19.71	20.25	21	20.7	20.26
Interspinous	25–25.5	26	25.47	25.5	26	26.4	24.94
Intercristal	26–27.5	28	28.00	28.0	29	28.2	28.31
Intertrochanteric	30–30.5	.....	30.90	31.0	32	.....	32.19

	CAUCASIAN RACE						
	ENGLISH	GERMAN					
	BERKELEY AND BONNEY	BUMM	WINTERNITZ	BAISCH	DÖDERLEIN	RUNGE	AHLFELD
Ext. conjugate	.....	18-20	20	20-22	20	20	19.5-20
Interspinous	25.5	26	25-26	25	25-26	26	24
Intercristal	27.5	29	28-29	28	28-29	29	28
Intertrochanteric	.....	31	.....	31	31-32	31.5	.....

	CAUCASIAN RACE					OTHER RACES	
	IRISH	SCOTCH	FRENCH		JEW	FILIPINA	NEGRO
	TWEEDY	JOHNSTONE	ADAIR	CAZEAUX AND TARNIER	JEWETT	ACOSTA-SISON AND CALDERON	RIGGS
Ext. conjugate	21.0	18.75	19.94	18.75	20.0	17.64	19.32
Interspinous	26.0	23.75–25	24.55	23.75	26.5	23.71	23.99
Intercristal	29.0	26.5–27.5	27.82	26.25	28.0	25.29	26.0
Intertrochanteric	.....	30.0	31.41	.....	.....	27.55	30.09

is 0.96, that between the femur and humerus is 0.84, that between the clavicle and scapula is 0.12, and that between the humerus and radius is 0.74.

In order to compare the present study with that of Acosta-Sison and Calderon, their curves were studied and reduced as accurately as possible to the mathematical status of the French and American pelves, and curves of this information were plotted and compared with the pelvic curves of the French and American women. These curves are shown in Figs. 7 and 8. They had only three measurements which could be compared, namely, the external conjugate, interspinous, and intercristal. These curves are somewhat different from either the

Digitized by Google

French or the American. The difference is especially noticeable for the intercristal diameter. The location of all of the curves is to the left, indicating a much smaller type of pelvis. The maximum and

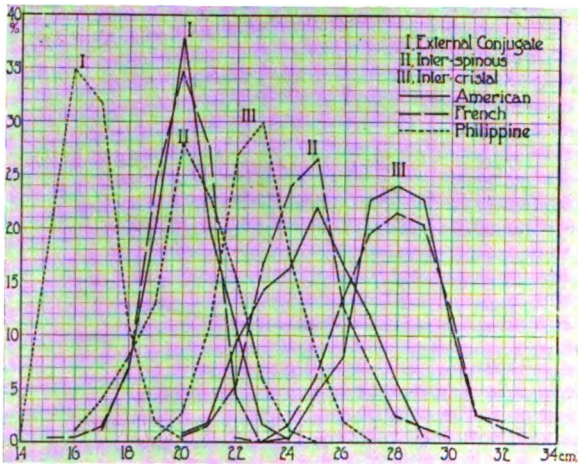


Fig. 7.—Comparison of pelves of French, American, and Philippine women. Percentage frequency graphs.

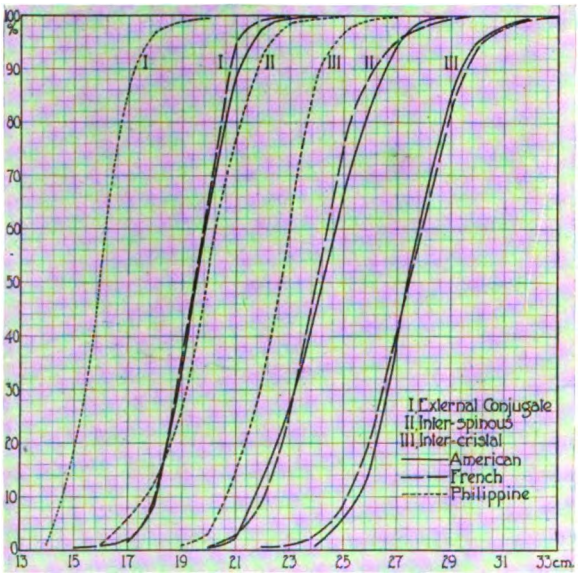


Fig. 8.—Comparison of pelves of French, American and Philippine women. Cumulative percentage graphs.

minimum as well as the average measurements are much lower for the Filipina pelvis than either the French or the American. It is evident from these curves that the Filipina pelvis does not conform to the usual type of either the French or the American pelvis. It would be

Digitized by Google

TABLE XI

PELVIC MEASUREMENTS OF DRY PELVES FOR VARIOUS RACES AND NATIONALITIES

	AMERICAN INDIAN	BUSHMAN	AUSTRALIAN	JAVANESE	PERUVIANS	MEXICANS
	EMMONS	VROLICK	LE VERNEAU	VROLICK	LE VERNEAU	
Interspinous	22.6	17.0	18.2	20.2	21.7	18.0
Intercristal	25.7	21.5	23.7	21.8	25.4	22.1

	ARYAN(?)	CHINESE		EGYPTIAN	EUROPEAN	BENGALESE	NEW CALEDONIA
	JOULIN	JOULIN	LE VERNEAU	LE VERNEAU			
Interspinous	26.0	20.5	22.6	22.4	22.2	17.9	20.4
Intercristal	27.0	22.0	25.2	26.2	26.6	21.6	26.2

	NEGROES OF VARIOUS PROVINCES						
	VROLICK	JOULIN	LE VERNEAU				
Interspinous	19.1	21.2	21.7	17.4	17.7	20.5	20.3
Intercristal	21.4	23.4	26.9	22.8	22.0	25.9	24.8

very interesting to plot the curves of the negro pelvis for comparison with the French, American and Filipina pelves, but unfortunately a series of individual measurements of negroes was not available to the author. We have so few negroes in our section of the country that it would be almost impossible to secure a series of these measurements.

A simple device for determining whether or not a given pelvis conforms to type has suggested itself to the author. It consists of a simple centimeter scale with movable slides which can be placed at the points which correspond to the measurements in the individual case. This scale is then placed on the ordinate paper which is ruled on the centimeter scale. The points where the measurements fall on the four cumulative percentage curves can be easily noted. In this manner it can easily be seen whether or not a given pelvis conforms to the usual or average. This method could be used not only for external measurements, but for similar curves plotted on any pelvic measurements, for instance, those of the pelvic outlet.

VI. SUMMARY

1. French and American pelves show the same general external form.

2. The French pelves are in the main slightly smaller than the American. The average external measurements of the French are uniformly smaller than the American.

Digitized by Google

3. The range of variations of external measurements is generally somewhat greater in the French than in the American.

4. The standard deviation is about the same for the French and the American pelves, some measurements showing slightly more in the American, others a slightly greater deviation in the French.

5. The coefficient of variability is quite low and is about the same for both groups.

6. The correlation of the different measurements is definitely lower in the American than in the French pelves. The same measurements, however, show about the same order of correlation in both series, the lowest correlation being between the external conjugate and the interspinous, and the highest between the interspinous and the intercristal.

VII. CONCLUSIONS

1. The author appreciates fully the limitations of external pelvimetry, but also feels that the value of this method of examination may be increased by better methods of statistical study.

2. The racial and national pelvic differences should be more carefully studied and recorded so that observations made and conclusions drawn in one section of the world may not be applied too arbitrarily in other sections.

3. There are apparently definite pelvic differences, not only in different races, but in different nationalities. This was indicated by the earlier work of Le Verneau and Vrolick. It is shown definitely by the work of Williams and his associates in comparing the pelvis of the negro with that of the white, by the studies of Emmons and De Souza, also by those of Acosta-Sison and Calderon. The present study also shows less marked, but none the less definite, indications of national as well as racial pelvic differences which are apparent even on external examination of the living subject.

4. It is, of course, obvious that much more accurate deductions could be drawn by more complete and extensive pelvic measurements. The author regrets that he has been unable to make these comparisons, but the conditions under which the work was done made it none too easy to secure even the measurements which were obtained.

BIBLIOGRAPHY

Acosta-Sison and Calderon: Pelvimetry and Cephalometry Among Filipina Women and Newborn Babies, Philippine Journal of Science, 1919, xiv, p. 253. *Baisch*: Geburtshülfe, 1919. *Barlow*: Mathematical Tables. *Berkeley and Bonney*: The Difficulties and Emergencies of Obstetric Practice, 1913. *Bourne*: Pelvic Measurements in Antenatal Clinics, Brit. Med. Jour., 1919, No. 3029, p. 70. *Bumm*: Geburtshülfe, 1908, ed. 5. *Cazeaux and Tarnier*: Theory and Practice of Obstetrics, 1885. *Cragin*: Practice of Obstetrics, 1916. *Davenport*: Statistical Methods, 1904, ed. 3. *De Souza*: The Measurements of the Pelvis, With Special Reference to Obstetric Prediction, Biometrika, 1913, ix, 486. *Döderlein*: Handbuch der Geburtshülfe, 1915. *Dougal*: Some Observations on Pelvimetry, Jour. Obst. and Gynec., British Empire, 1913, xxiv, 263. *Ehrenfest*: Present Status of Pelvimetry,

Digitized by Google

Am. Jour. Obst., 1906, liii, p. 465. *Emmons*: A Study of the Variations in the Female Pelvis, Based on the Observations Made on 217 Specimens of the American Indian Squaw, Biometrika, 1913, ix, 34. *Grandin and Jarman*: Practical Obstetrics, 1896. *Huntington*: The True Value of Certain External Pelvic Measurements. American Journal of Obstetrics, 1917, lxxvi, 277. *Johnstone*: Textbook of Midwivery, 1918. *Joulin*: Traité Complet D' Accouchements, 1867. *Le Verneau*: Le Bassin, 1875, p. 59. *Runge*: Geburtshülfe, 1891. *Van der Hoeven*: Der Wert Einiger Beckenmasse. Monatschr. f. Geb. u. Gynäk., 1912, xxxv, 1. *Vrolick*: Joulin, As above. *Williams*: Obstetrics, 1919. *Winternitz*: Schwangeren Untersuchen, 1900.

DISCUSSION

DR. HUGO EHRENFEST, ST. LOUIS, MISSOURI.—The paper as presented by Dr. Adair does not give one any adequate idea of the immense amount of work that was involved in its preparation. I regret that Dr. Adair did not have an opportunity to bring out the value of such painstaking care in correctly tabulating findings. I always have been interested in the problem of pelvimetry, but can add very little of value to the subject. Dr. Adair quotes me as having said twenty years ago that external pelvimetry is not of very great practical value to the obstetrician. I have not changed my opinion very much since then. However, pelvimetry has outside of its limited obstetric value also a specific value for the determination of the shape of the pelvis. There are definite racial differences in the shapes and sizes of pelves, and Dr. Adair has added to our knowledge from that point of view. The anthropologist attaches, however, more value to pelvic inclination than to pelvic measurements, and I am sorry Dr. Adair did not give us some information concerning variations in pelvic inclination in the large number of cases he studied so thoroughly.

Another factor which militates against the anthropologic value of these studies is that Dr. Adair speaks of "American women," and at the same time acknowledges that they represent a mixture of races and nations.

As to the obstetric application of his findings, I personally feel that the problem of pelvimetry, as a rule, is not properly understood. The obstetrician, usually not a good mathematician, attempts to solve an equation which contains only one known but at least three unknown factors. The four quantities required for the solution are: the size of the pelvis, the size of the fetal head, the degree of compressibility of the head, and the force available to press the head through the birth channel. The obstetrician in general lays all the stress on that one factor of the pelvic dimensions. Some efforts have been made to determine the size of the fetal head. The obstetrician, however, has no information concerning the factor of compressibility of the head and cannot forsee the amount of expelling force that will be available.

I may add that there is a very interesting relation, from my point of view, between the anthropologic and obstetric aspects of the female pelvis in this country. We do know that most races have their characteristic pelves, small or large, and that in the new born infants the cephalic diameters are proportionately smaller or larger in the same ratio. There is a definite anthropologic relation between the size of the fetal skull and the pelvic dimensions. I do not think that enough stress is laid on the incidence of obstetric complications that arise in this country as the result of the mixing of races in marriage.

DR. EDWARD P. DAVIS, PHILADELPHIA.—This is a valuable scientific communication, but let us bring it down to what we can actually do in teaching. External pelvimetry and palpation of the pelvis externally are valuable in calling the attention of the medical student to disease in the mother's skeleton and to rickets. A rickety mother will often have a rickety baby, and intrauterine rickets has occasioned many serious complications in labor.

Digitized by Google

As to the use of the x-ray in connection with this work, Dr. Manges of the Jefferson Hospital, Philadelphia, a recognized authority in x-ray work, at my suggestion has made a careful chart of the normal pelvis. He can x-ray perfectly the average pelvis. He can x-ray the pelvis in a given case and by comparing the two by his own method he can give the absolute measurements of the pelvis.

There is one method to which I wish to call attention. Take a sheet of lead of convenient thickness and cut a ribbon of half an inch, and have it ready when the child's cranium is expelled, and then simply mold that ribbon of lead around the cranium, transfer the lead carefully to tracing paper and make a tracing, and you thus have a measurement of the fetal head. We should, I think, very carefully teach palpation of the head as it descends into the pelvis.

DR. RUDOLPH W. HOLMES, CHICAGO.—Different peoples have different statures; just as statures vary, so do the component parts of the body vary. The Filipinos are small people, and naturally their pelves are small; also, as the babies are small, the fact of the undersized pelves is of small obstetric significance. Filipinos have told me dystocia among their people is rare.

Dr. Ehrenfest mentioned as one of the problems injury to the soft parts. The soft parts have an important part in causing dystocia in pelves of minor contraction. A pelvis of say 9 centimeters might offer insuperable difficulty to the birth of the child, yet that same pelvis dried would permit the given baby to pass through without difficulty.

I was glad to hear Dr. Davis speak of the lead ribbon; it is a valuable contribution in that it furnishes a positive configuration and dimension of the obstetric canal.

Digitized by Google

ACUTE MALIGNANT ENDOCARDITIS COMPLICATING PREGNANCY

By Palmer Findley, M.D.
Omaha, Nebraska

MRS. B., age thirty, ii para, seen in consultation with Dr. Malcolm Campbell of Malvern, Iowa, was seemingly in perfect health until early in her third pregnancy when she suffered from pains in ankles, hips and shoulder joints which her family physician diagnosed as rheumatic arthritis. The tonsils and teeth were not involved but the nasal passages were occluded with mucopurulent secretions and incrustations which persisted and prevented her from breathing through the nose. This was the only focal infection discerned. She rapidly lost flesh and strength and became extremely anemic and nervous. There were repeated chills with an irregular course of fever ranging to 104°F. Shortness of breath and palpitation of the heart are recorded as early symptoms. The aortic and mitral valves were early involved and later the tricuspids as well. Blood cultures were taken and the Streptococcus viridans found. Precordial friction sounds were observed as a late development. The urinary findings were negative until near the end when the urine presented the usual findings of an acute nephritis and this was associated with uremic symptoms. Death was preceded by coma and convulsions. About three weeks before her death she was seen by a competent internist, Dr. W. O. Bridges. She was then pregnant about 16 weeks. Dr. Bridges advised the interruption of pregnancy which I accomplished by infiltrating the cervix with 1 per cent novocain solution, followed by a Dührrsen bilateral incision. No depression followed the operation, the patient seemed to improve for two weeks when the kidneys became acutely involved and a week later she died in uremic convulsions and coma.

For practical purposes acute endocarditis is classified as simple and septic (malignant). These types probably represent varying degrees of the same morbid process according to the virulence of the micro-organisms and the resistance of the tissues. The clinical phenomena and anatomic changes do not differ essentially in the various etiologic forms. The septic type is of special interest to the obstetrician in that it is not infrequently found in association with puerperal infections. Clinically the septic form of acute endocarditis is distinguished from the simple type by the occurrence of chills, irregular course of fever and the appearance of multiple emboli. Malignant endocarditis is always of bacterial origin and should be regarded as a local complication of a general infection.

Because of the fairly frequent association of acute malignant endocarditis with puerperal infections we find this type of cardiac lesion twice as frequent in women as in men. According to Lenhartz, 21 per cent of all cases of septic endocarditis are of genital origin. It is rare that any other than the puerperal form of genital infection is complicated by septic endocarditis. Of the etiologic factors, the strepto-

Digitized by Google

coccus ranks first in point of frequency and virulence, the staphylococcus second and the pneumococcus, meningococcus, diphtheria bacillus and colon bacillus are occasional factors. The gonococcus is a rare finding but has been known to be rapidly fatal; such cases have been reported by Külbs, Finger, Ghon, Schlagenhaufer, Taylor, Thayer, Sternberg, von Leyden, Lenhartz and von Dabney.

The septic or malignant type of acute endocarditis is usually ushered in by repeated chills, followed by an irregular fever and sweating, the temperature is commonly of a remittent type, the pulse is accelerated and feeble, the respirations rapid and superficial and associated with the above symptoms there is usually extreme nervousness, even delirium, vomiting, tympanites, diarrhea and a gradual failure of strength. These are manifestations of a general septic condition. Later metastatic abscesses may appear in various parts of the body. Heart murmurs may or may not appear and are not evidence *per se* of a septic type of endocarditis. They may be absent in the septic type and are common to the simple forms. The entire course of the disease rarely extends beyond two weeks and the results are almost invariably fatal.

The so-called "septic type" is common to acute malignant endocarditis in connection with puerperal sepsis. In this form the heart symptoms may be masked by those of general sepsis and the first intimation of the involvement of the heart may be the appearance of emboli.

All authorities agree with Fritsch that the malignant type is commonly engrafted upon previously diseased valves. While admitting possible recoveries, Osler has never seen a case that did not prove fatal. The only excuse for bringing this case report before the Society is the very unusual occurrence of acute malignant endocarditis in the course of an otherwise normal pregnancy. Croom found no more than six cases in the literature to 1906.

Digitized by Google

VAGINAL SUPRACERVICAL HYSTERECTOMY WITH INTERPOSITION OF THE CERVICAL STUMP FOR CYSTOCELE AND PROCIDENTIA ASSOCIATED WITH ENLARGEMENT OF THE UTERUS

By Hiram N. Vineberg, M.D.
New York City

IN FEBRUARY, 1915, I presented a short communication to the Obstetric Section of the New York Academy of Medicine upon the operation designated in the title of this paper. I drew attention to the circumstance that not infrequently in procidentia and cystocele, the uterus was found too large to be suitably interposed. The enlargement most often was due to what has been variously termed as chronic metritis, fibrosis, areolar hyperplasia and more recently simple hypertrophy. The enlargement might also be due to fibroid nodules of various size or to a single fibroid growth which increased the volume of the uterus to the size of the gravid organ at the eighth week. With any greater enlargement of the uterus it is questionable whether the vaginal operation would not be found too difficult and tedious, although I have performed it in a few instances where the uterus was the size of the gravid organ at the tenth and twelfth week. Again there are cases when the uterus may not be increased in size and still not be suitable for interposition, e. g., cases of persistent bleeding, the so-called idiopathic metrorrhagia. The surgical procedure hitherto employed to reduce the size of the uterus in the above class of cases has consisted in the excision of a wedge-shaped piece either from the anterior wall or from the fundal area. Most operators, among whom I number myself, found the method unsatisfactory because it was rare to get primary union of the very much thickened and certainly not normal uterine walls. Protracted suppuration was almost the rule and the mortality was rather high.

Another procedure resorted to in these cases is a total hysterectomy with suturing of the round ligaments (Goffe) or the broad ligaments (Mayo). This procedure, however, is usually restricted to elderly women with very much stretched and thinned out tissues.

A third procedure and the one forming the basis of this paper consists in amputating the body of the uterus at or above the level of the internal os and fixing the cervical stump to the subpubic ligament, thus forming a firm and solid support for the bladder. When, as fre-

Digitized by Google

quently obtains, the vaginal portion is very much elongated or lacerated and the lips everted and hypertrophied, it is amputated and there will still remain a good-sized stump for the purpose of interposition. The redundant anterior vaginal flaps are excised and sutured to the cervical stump as is done in the usual interposition operation.

As far as I could ascertain from a search of the literature, Löwit (Zentralbl. für Gynäk., 1911, xxxv, 297) was the first to employ the cervical stump after amputating the body of the uterus as a *pelotte* to hold up the bladder in cases of procidentia and cystocele. The technic I have developed differs from that of Löwit in two particulars: (1)

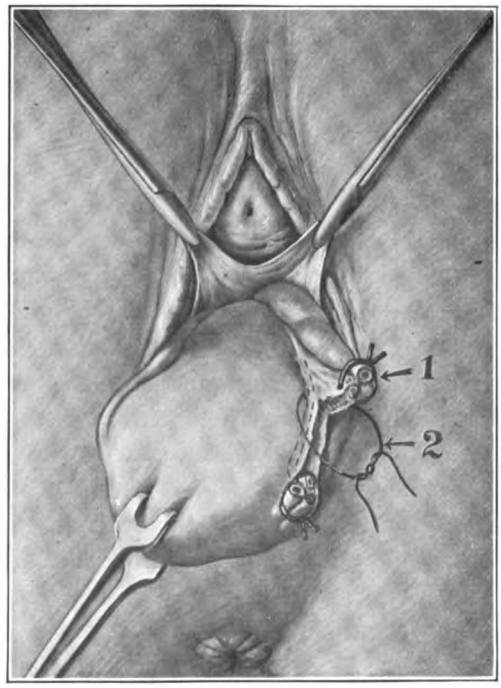


Fig. 1.—Shows uterus everted, left adnexa ligated and removed (1); ligature thrown around the uterine artery but not tied (2).

the application of the subpubic suture (Fig. 3) which I consider a great advantage, (2) in the amputation of the vaginal portion when it is markedly elongated or diseased.

The steps of the operation are as follows: (1) Longitudinal incision of the anterior vaginal wall extending from near the urethral meatus to within an inch or an inch and a half of the cervical os. (2) Separation by sharp or blunt dissection of the vaginal flaps from the underlying bladder. (3) The bladder is pushed up from the uterus and the base of the broad ligaments by gauze or scissor dissection. (4) Transverse incision of the vesico-uterine fold. (5) Delivery of the

Digitized by Google

body of the uterus through the vaginal incision. Up to this the steps are identical with those of interposition of the uterus. (6) If the ovaries are to be retained a ligature is passed around the ovarian ligament and the uterine end of the tube on either side and the tissue cut between the ligature and the uterus (Fig. 2). If the ovaries are to be removed for one reason or another the ligature is passed around the infundibulopelvic ligament containing the ovarian vessels. (7) A ligature is passed at the level of the internal os on either side to embrace the uterine artery (Fig. 1). The body of the uterus is then amputated at the desired level by a curved incision with the concavity

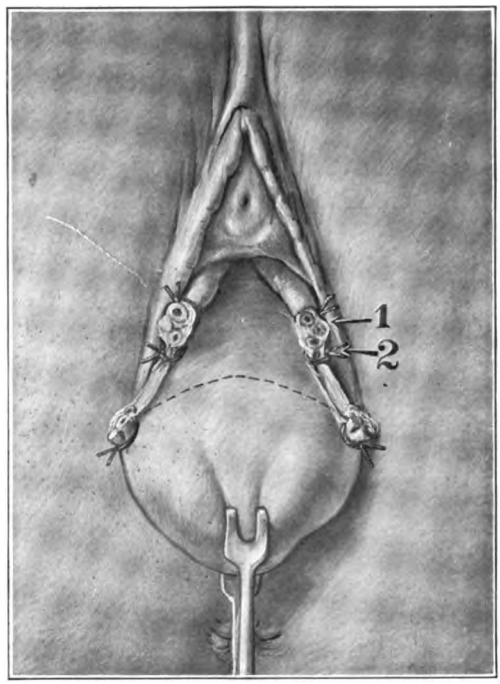


Fig. 2.—Shows everted uterus with both broad ligaments ligatured and cut. Dotted line indicates level of amputation of the body of the uterus.

towards the cervix (Fig. 2). The edges of the wound on the cervical stump are carefully coaptated by chromic catgut sutures. When the patient is under forty years of age and it is desirable to retain the menstrual function, the incision should be made higher up on the body so that a portion of the body with the corporeal endometrium is left with the cervical segment. This was done in a few of the cases and menstruation, though scanty, was preserved. (8) The cervical stump is now fixed to the subpubic ligament in the following manner: A chromic catgut suture is carried laterally for the distance of about an inch through the subpubic fascia underneath the vaginal mucosa then pene-

Digitized by Google

trates the cervical stump from behind forwards (in other words the suture transfixes it) and is carried through the subpubic fascia in the opposite direction from the other side (suture No. 1 in Fig. 3). Note that the vesicouterine peritoneum is purposely avoided in this suture. When the suture is tied, the cervical stump is brought up tightly against the raw tissues underneath the pubic arch and a firm union must result. With such a solid plug fixed to the subpubic ligament it is impossible for the bladder to come down. This assumption has been confirmed by the subsequent observation of the patients operated upon. If the vaginal portion is eroded, lacerated, and hypertrophied

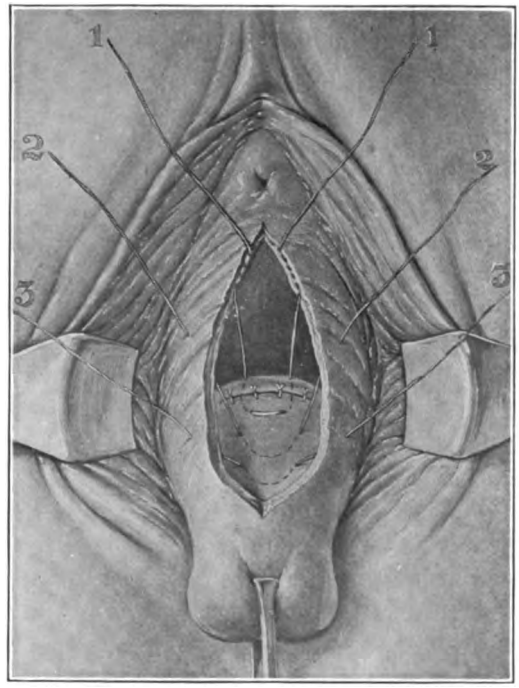


Fig. 3.—Shows manner of introducing sutures: (1) passing through uterus and subpubic ligament; (2 and 3) vaginal sutures including cervix.

or considerably elongated, it is amputated in a suitable manner and the resulting wound carefully coaptated by chromic catgut sutures. Should the vaginal flaps be redundant, a strip of the proper width is excised from either one. They are then sutured together, the sutures being carried through the anterior wall of the cervical stump. In some instances the anterior vaginal wall being longer than the cervical stump a transverse fold forms on either side. The edges of these folds can be sutured together by a running catgut suture. The operation is completed by doing the necessary plastic work upon the posterior walls and perineum. It has occurred to me that perhaps an additional

Digitized by Google

support to the bladder might be obtained by suturing together the broad ligaments as in the Mayo operation, but the observation of my results has convinced me that any additional support to the bladder is not needed. Therefore there would be no sense in adding to the length of the operation, which is time consuming as it is, by any unnecessary elaboration.

I began doing the operation in 1912 and until the time of my presentation in February, 1915, I had performed it in 10 cases. From that date until March 1st, 1921, on the second Gynecological Service of Mt. Sinai Hospital, of which I had charge, the operation had been performed in 53 cases; of these 27 were operated upon by myself, the remaining 26 by my associates on the service and the different house surgeons. During this period I have performed the operation in 20 private cases, making a total of 83 cases. It is interesting to note in what proportion of cases of procidentia and cystocele the uterus was found too large for interposition. I deem the uterus as being too large when it is the size of the gravid organ at the fifth or sixth week, or when the walls are very thick and hard. In the period covered by the series of cases reported in this paper I had in private and public practice 226 cases of interposition for procidentia and cystocele, consequently in 309 successive cases of procidentia and cystocele there were 83 cases, or 37.2 per cent, in which the uterus was found too large to be interposed. There was one death in my own personal series of 57 cases, i.e., a mortality rate of 1.8 per cent. There was one death in the 26 cases on the service operated upon by others than myself. The mortality, therefore, for the combined series of 83 cases, was 2.4 per cent. In my own fatal case the patient had been doing well for 12 days, she then developed some fever and on opening the upper angle of the vaginal wound a small amount of pus and tarry blood escaped. A small gauze drain was inserted. The fever then subsided but four days later, during my absence symptoms of intestinal obstruction set in. An exploratory abdominal section was done and purulent peritonitis was found. The patient died the next day. Suppuration in the bed of the interposed cervix occurred in 6 cases. In opening up the upper angle of the wound the process rapidly disappeared with the exception of two cases which took two and three weeks, respectively, to clear up. The final anatomic result was not impaired by the complication.

With increased experience in the technic of the operation the cases of suppuration have been decreasing. It is important to trim the pedicles closely and to effect a good coaptation of the edges of the cervical stump. As nearly all of these cases are associated with marked congestion of the tissues and engorgement of the blood vessels I usually insert a small gauze drain between the vaginal flaps and

Digitized by Google

the side of the cervical stump. This is removed in 48 hours. Taking into consideration the local conditions in many of the cases at time of operation, the extensive erosions of the cervix, with distended and engorged infected nabothian follicles, with marked edema of the vaginal walls, it is surprising there were comparatively so few cases in which suppuration occurred. Many of the cases should have been subjected to a fairly long course of preparatory local treatment. But in the stress of present-day life, it is difficult to carry this out in private practice, at least in New York City. It is not any easier in public practice as it is not possible with a limited number of ward beds to keep a patient in the hospital two or three weeks prior to operation. In two cases, vesicovaginal fistulæ followed the operation in the hands of my associates. These closed spontaneously after an interval of two or three weeks.

AGE OF THE PATIENTS

30-35	35-40	40-45	45-50	50-55	55-60	60-65
2	16	29	23	8	3	2

The ages varied from thirty to sixty-five years. Sixty cases, or 72.3 per cent, occurred between the ages of forty and sixty-five years.

ULTIMATE RESULTS OF THE OPERATION

In the private series of 30 cases we have to deduct the 6 cases operated upon during the past twelve months as being too recent upon which to report. The remaining 24 cases have been under observation from one to nine years. There was one failure. There was a recurrence of the prolapse of the vaginal walls and the cervical stump prolapsed to the introitus. The parts, however, have been easily kept up by a small ring pessary which was not possible to do prior to the operation. This was among the first five cases operated.. One patient continued to complain of a great variety of pelvic symptoms although the anatomic result was good. In the remaining 22 cases the anatomic results are good in all and in a great number of them they are simply ideal. The stump of the cervix is high up in the vault of the vagina, it is movable and there is no protrusion of the bladder, even when the patient bears down. All of the patients are free from all pelvic symptoms.

The data of the ultimate results of the hospital ward series of 53 cases are very meager, inasmuch as the follow-up clinic in the hospital has as yet not been fully developed. The patients were requested to return periodically for observation, but only 13 of them followed the request. In one of these cases there was a recurrence of the cystocele and in a second case there was slight protrusion of the anterior vaginal wall. In a third case the vaginal portion which had been very

Digitized by Google

much elongated but which had not been amputated, protruded outside the introitus a few months after the operation. I amputated the vaginal portion afterwards and the result since then has been most satisfactory. In the remaining ten cases the results were perfect.

My experience with our follow-up system as it is constituted, has taught me that in most conditions it serves no guide as to actual results, for as a rule only those patients return who have something to complain of, no matter how remote a bearing it may have to the operation. Hence it may be fair to assume that of the 40 patients who did not return the results were good in the majority of them.

CONCLUSIONS

(1) In over one-third of the cases of procidentia and cystocele the uterus is found too large to be adapted for interposition.

(2) Decreasing the size of the uterus by excising a portion of the anterior wall or fundus has been found unsatisfactory on account of the rarity of obtaining primary union of the thickened and diseased walls of the uterus and the consequent high morbidity and mortality.

(3) A much more advantageous procedure consists in amputating the body of the uterus at the level of the internal os or higher up (if the patient be under forty years of age) and interposing the cervical stump.

DISCUSSION

DR. THOMAS J. WATKINS, CHICAGO, ILL.—Personally, I feel the term "interposition" is an unfortunate one, and prefer the term "transposition" of the uterus and bladder. It is a bladder operation. To specialists like Dr. Vineberg it makes no difference whether you call it interposition or transposition, but to others the term is misleading.

Dr. Vineberg did not tell us the size of "the uterus that is too large." In our earlier cases we extended this operation in a research way, to determine how large a uterus could be successfully transposed. We transposed some that were too large. What happened? The fundus protruded and a wedge-shaped piece of the fundus had to be taken off later in some 4 or 5 cases. A uterus transposed that is too large never gives trouble afterwards because of remaining large. It always atrophies. The increased amount of atrophy may permit the fundus to protrude.

The most important feature in this paper is the question of infection. The dangers of infection vary with the amount of operative work done. One can transpose the uterus with very little danger of infection, but with excision of parts of the body of the uterus the danger of infection is much increased. The danger of infection is so much increased that if I have to excise the fundus and transpose the cervix, I usually make a supravaginal hysterectomy from above and transpose the cervix from below. The vagina is always a septic field, irrespective of cleansing and antiseptics. The wound remains in close contact with the septic area. It does not take any extensive bacteriologic investigation to prove this contention. Gauze left in the so-called sterilized vagina soon becomes offensive. Serum and blood after operation in contact with the vagina soon become infected.

The modified transposition operation of suture of a portion of the broad ligaments after excision of the anterior lip of the cervix, thus shortening and bring-

Digitized by Google

ing the severed portion of the broad ligaments together and doubling the cervix upon itself, has given excellent results in selected cases. The uterus is thus left high in the pelvis supported by strong buttress. If supravaginal hysterectomy and amputation of the cervix is made *per vaginam* the entire mucosa of the cervix should be excised to save time and a possible stenosis.

DR. GEORGE GRAY WARD, JR., NEW YORK CITY.—This operation described by Dr. Vineberg is one that has interested me for some time. I have done it on several occasions in past years without being aware as to who was the originator of the procedure, and I find it very satisfactory.

In looking up the literature of the subject I found that in 1909 Löwit and Rieck published (Monatschr. f. Geb. u. Gyn., xxx, 724) a report of an operation which, as far as I can see, has the same principle, and therefore I presume the credit for this procedure more or less belongs to them. They state in their report that the corpus uteri is removed and the cervix uteri sewed into the vesicovaginal septum to support the cystocele. That is the principle of the operation. In 1911 I understand Pfannenstiel, Cohn, and Franque also practiced this method. We all see cases with a large cystocele, with diseased cervix, and a uterus that is not suitable to leave or to interpose, and we occasionally see a uterus in such cases with a large growth which makes it difficult to do this operation through the vagina alone. In these cases we have been in the habit of doing an amputation of the cervix and separation of the bladder from below, with repair of the pelvic floor, and then opening the abdomen for the rest of the procedure, and my associate, Dr. Farrar has worked out a technic for this type of case which has proved very satisfactory and the results have been all one could desire as far as we have been able to follow them. A description of the technic will appear in the AMERICAN JOURNAL OF OBSTETRICS AND GYNECOLOGY.

As to the matter of infection to which Dr. Watkins has referred, I think he is correct when he says that the amount of infection is proportionate to the amount of manipulation. That is practically true in all vaginal procedures that are extensive. We have been in the habit of using a rubber tissue drain inserted in the line of incision on the anterior vaginal wall, which is fastened to a piece of silk or linen, and is removed on the morning of the fifth day as a rule. I believe this has prevented the formation of a hematoma and possibly infection in many of these cases. We use it in the transposition operation or any procedure where there is extensive separation of the bladder from the anterior wall of the vagina.

DR. G. BROWN MILLER, WASHINGTON, D. C.—Those of us who do cystoscopic work in connection with gynecology will be interested in inquiring of Dr. Vineberg what percentage of his cases had bladder symptoms subsequent to this operation. I have had the opportunity to observe some cases in which the interposition operation has been done, not as Dr. Vineberg described it, but in which the whole uterus has been interposed between the bladder and anterior vaginal wall, and some of them have had marked bladder symptoms. In one case that had an intractable bladder condition I found a small fibroid tumor pushing up the under surface of the bladder which had developed since the operation was done. We know that some of the worst results from the Wertheim and similar operations, such as complete hysterectomy, in which the bladder has been traumatized by being separated from the uterus, have been due to infections of the bladder and as trauma of the bladder predisposes to this condition, as a rule, I believe that so far as we can, in our operations upon the vagina and uterus, we should inflict as little traumatism as possible. Dr. Vineberg's statistics include a number of infections and vesicovaginal fistulae, and I would be surprised if some of his cases did not have cystitis fol-

Digitized by Google

lowing operation and perhaps conditions of the bladder that took a considerable time to overcome if they were overcome at all.

DR. J. RIDDLE GOFFE, NEW YORK CITY.—About 25 years ago I revived interest in and called attention especially to the condition which the paper claims to relieve. Up to that time the Emmet operation was the only one in vogue, and having had failures from it, as we all had, I studied the situation and evolved an entirely original method. I do not need to go into detail before this Society in explaining the procedure. The one feature that was absolutely original was the removal of the uterus and the substitution of the broad ligaments as a basis of support by stitching them together across the pelvis. This relieves the situation and gives a plane of tissue for support that answers perfectly the condition we have when a small uterus is there. It therefore seems to me preferable to the modification just presented by Dr. Vineberg in cases of large septic uteri. But what I desire especially to direct attention to this morning is the fact that Dr. Charles Mayo has adopted this original procedure of mine, combined it with an equally original procedure of another member of our Society, Dr. Watkins, and with elaborate illustrations published it to the profession as an original procedure of his own. It is therefore becoming known among general surgeons as the "Mayo operation." This is indignity enough, but when we find members of our own Society announcing on the bulletins of their daily clinics the Mayo operation for procidentia, what can we say of their loyalty to their specialty and to their fellow members of this Society? When reproached for this injustice, the reply of one of our members has been, "Well, you know Mayo is a name to conjure with." Is it honest, is it fair to employ procedures invented, employed and published to the profession by our own members and apply to them the name of a general surgeon because for such "it is a name to conjure with," and may gain his approbation?

As I have remarked, Dr. Mayo gives credit to nobody for it, and yet there are two members of this Society who are responsible for the whole procedure. It should have the name of Watkins or Goffe, or both, rather than that of any other individual.

DR. JOHN A. MCGLINN, PHILADELPHIA, PENNSYLVANIA.—The procedure outlined by Dr. Watkins and the one outlined by Dr. Goffe are sufficient to cure cystocele and prolapse of the uterus. I find in my work there are certain types of uteri which are not proper to interpose, and in these cases I do not see any reason why the operation should be complicated by leaving any part of the uterus to act as a dangerous point for infection or for possible malignancy, and I usually take out the uterus, which is much easier than to do a subtotal hysterectomy through the vagina and interpose the broad ligaments between the bladder and vagina. I do not refer to this operation as the Mayo operation.

Some years ago I saw Dr. Goffe do his operation, and one day I did the operation according to Dr. Goffe's technic long before the so-called Mayo operation was published. I placed my stitches in such a way that I found I did the operation which was eventually called the Mayo operation. I refer to the operation entirely in my work as Dr. Goffe's operation, because I think Dr. Goffe is the originator of it, but I have a slightly different way of doing the procedure from what Dr. Goffe advocated. Why we should leave behind a cervix which may undergone degeneration, which may give rise to an intractable leucorrhea, which may act as a point of infection, when total hysterectomy through the vagina is much easier than the other procedure, I do not know. This operation is sufficient to cure as I have had experience with it recently. A general surgeon not far from the city in which I live does not believe that the gynecologist should exist as such, and so far as obstetric

Digitized by Google

cases are concerned, the only obstetric procedure which he does is a cesarean section done at variable periods during pregnancy. This gentleman attempted to cure a prolapse of the uterus recently by doing a total abdominal hysterectomy. He cured the prolapse of the uterus because there was no uterus left behind to prolapse, but nothing was done on the prolapsed vaginal wall, so that when the case came to me she had a total prolapse of the vagina. I resorted to the vaginal procedure, opening up and isolating what was left of the broad ligaments and suturing them together according to the method of Dr. Goffe, and then doing extensive plastic work sufficient to cure the cystocele and rectocele. So long as this operation of complete hysterectomy by vagina with the technic evolved by Dr. Goffe is sufficient to bring about a cure, why complicate the operation by other procedures, by leaving behind a part of the uterus?

DR. ROBERT L. DICKINSON, BROOKLYN, NEW YORK.—Having done between 40 and 50 Goffe operations for prolapse of the uterus before the Mayos did it, and having put a single suture through the broad ligaments as a modification of Goffe's operation, and published it long before the Mayos were using it, I desire to back up what Dr. Goffe has said. A single step in the so-called Mayo procedure is the very desirable provision of putting on four clamps, which brings within the reach of the surgeon the broad ligaments to suture more readily and possibly prevents slipping away of the upper ends of the broad ligaments which in unskillful hands might provoke secondary hemorrhage.

I also have tried the modifications spoken of by Dr. Vineberg, and it nearly doubles the length of the operation to leave in the cervix and have it perhaps infected at both ends. In other words, you can build up the broad ligaments amply and have a sufficient bridge with which to hold up the bladder.

Dr. Goffe has not spoken of one of the most important items in his operation, and that is, the front bridge of broad ligaments, or better the unrelaxed broad ligaments back of the top of such a bridge, which constitutes a nearly perfect support for even the worst forms of cystocele, and these worst forms of cystocele are those in which the bladder is torn from the pubic anchorages. You have therefore an excellent support. Suppose these broad ligaments are so flabby or relaxed that they pull down, so that you can suture them easily together and easily hang the bladder to them, nevertheless they retract, the weight of the uterus being removed, in an astonishing way. It goes without saying that we can build a very effective pelvic floor by utilizing these pelvic structures.

I would like to voice a protest against gynecologists for forgetting for so many years what Dr. Goffe did and advocated in putting this method before the profession. To Dr. Mayo I made the same protest.

DR. J. WESLEY BOVÉE, WASHINGTON, D. C.—I think we are apt in this work to forget the structures that are the real supporting ones in the pelvis. Dr. Goffe has called attention to that. There is still a possibility for failure even from this procedure when we think only of a part of the pelvic floor, namely, the broad ligaments. We also have supports coming from the sacrum which help to make up the great diaphragm of tissue which must be considered, or we may have the posterior margin of the broad ligament thus constricted pushed down along the vagina. We must hold it well back. Perhaps it ill becomes me to mention the structures running from the cervix back to the sacrum, which are necessary to keep this diaphragm of tissue in good condition. We might easily get the uterus to hang behind the broad ligament shelf unless we see it is attached well posteriorly either by strengthening the uterosacral ligaments by rebuilding them or triplicating them, or in some manner making normal tension on them.

Digitized by Google

DR. VINEBERG (closing).—I cannot quite understand the nicety of discrimination between interposition and transposition. After all, the uterus is put between the bladder and vaginal wall, and that is an interposition, and I do not see that there is much to be gained by using the term transposition.

As regards the size of the uterus, I would say that any uterus that is above the normal size,—and we should be familiar enough with what is the normal size,—that corresponds in size with the pregnant uterus of five or six weeks, is too large to be interposed. A uterus that has thick walls may not be found enlarged longitudinally, but it has been my experience that enlarged uteri that are interposed do not atrophy. On the contrary, one of the things which made me turn to this operation was an experience I had of a patient in whom I interposed a uterus that was slightly enlarged, and later on the uterus became so large that I advised operation. The patient was so disgusted with me that she went to some one else and had an hysterectomy done.

The dangers of infection I think can be overcome. In all plastic work in the vagina a certain amount of suppuration will occur. I insert a piece of iodoform gauze at both angles in the anterior vaginal wound between the cervix and vaginal wall and remove it in about 48 hours. That stops the oozing, and also, if there is a collection of infectious material, permits drainage. I believe there is less danger of infection from below than above. If the case is taken in time and handled properly, even if there be an infection, and proper drainage be established, you will not get a fatality from it. I believe in my own case in which a fatality occurred that had proper drainage been instituted the patient would not have died. On the other hand, if you get an infection in a case operated upon from above, a peritonitis develops and your patient is practically beyond hope. The mortality is not any higher than the mortality of fibroids operated from above, which is at least 2 per cent in the best hands.

I have not made any claim of priority, and have given Löwit credit for his work, but I do claim there is an advantage in my method of fixing the stump of the cervix and of amputating the vaginal portion when it is lacerated or hypertrophied.

Bladder symptoms do occur in a certain number of cases whether you do the ordinary interposition operation, or whether you do this operation, but there have been no serious cases of bladder infection in my series. With a little treatment the bladder irritation will subside.

I am not prepared to enter into the merits of the Goffe operation over that of the Mayo operation. All I can say is that either is an excellent operation, but is indicated only in very elderly women. I heartily agree with Dr. Bovée that when you remove the cervix you remove a great deal of tissue that forms the pelvic support. There is a great deal of connective tissue around the cervix and cervical stump and the base of the broad ligaments which forms a support of great value. I must say that in the cases in which I have done total hysterectomy there was not the same good result, and I tried to follow both the Goffe and the Mayo methods. There is not the same support as there is when you get a good result from the operation such as I have described here this morning. There is a more firm and better support to the pelvic floor than there is when the whole uterus is removed.

Digitized by Google

THE INTERPRETATION OF VESICAL SYMPTOMS IN GYNECOLOGIC DIAGNOSIS

By Floyd E. Keene, M.D.
Philadelphia, Pa.
(From the Department of Gynecology, University of Pennsylvania.)

SYMPTOMS of deranged bladder function play an important rôle in the histories of many gynecologic cases and the proper interpretation of these symptoms presents problems of intense interest from the standpoint of diagnosis, and not infrequently it furnishes data upon which depend the indications for appropriate remedial measures. For a number of years I have been especially interested in the investigation of such symptoms and have made routine cystoscopic examinations in all patients presenting vesical symptoms irrespective of the nature or extent of the pelvic pathology. In the majority of cases the alterations in the bladder have been of a purely secondary nature, but their visual demonstration has proved an attractive study; on the other hand, we have been able to discover associated lesions which were entirely independent of the pelvic pathology, lesions often of more vital import than those within the pelvis whose presence might have remained unsuspected had symptoms alone formed the basis of diagnosis. Again, cases have been referred for the correction of some minor gynecologic anomaly supposed to be responsible for the vesical symptoms which, in reality, played no part whatever in their production, the actual lesion being in the bladder itself or upper urinary tract.

This paper will include a brief résumé of our findings, taking up first the alterations in the bladder, ureters or kidneys which are direct sequelae of the pelvic pathology, and secondly, certain types of associated lesions which we have encountered in our investigations. The object of this presentation is to emphasize the importance of detailed cystoscopic studies in all patients with vesical symptoms rather than the dependence upon the clinical history or laboratory examinations for their interpretation.

Because of its intimate anatomic relationship with adjacent structures, the bladder often participates in the pathology of these organs, whether this be in the form of a displacement, neoplasm or infection. The vesical symptoms arising from such participation naturally vary in degree as well as kind, and depend primarily upon the nature of the pelvic lesion and secondarily upon the subsequent changes either

Digitized by Google

within the bladder alone or in combination with the kidneys and ureters which may in their turn become involved.

Distortion of the bladder incident to the direct pressure or traction of benign tumors deserves but passing mention. Here the symptoms are primarily of a purely mechanical origin and are characterized by frequency of urination, especially just prior to and during menstruation, or more rarely by partial or complete obstruction to the passage of urine. Painful urination is usually the manifestation of an infection which may, with ease, be engrafted upon a chronic retention. Hematuria is rarely found in association with uncomplicated benign tumors and, when present, may be due to small varices in the bladder wall or to minute papillary excrescences of the mucosa in the immediate vicinity of the tumor, both incident to impaired circulation. Consequently, hematuria in association with a benign pelvic tumor should never be considered a secondary manifestation until proved so cystoscopically, for it usually signifies a lesion in the bladder or kidney entirely independent of the pelvic lesion. Likewise pyuria, in the absence of an antecedent history of retention or evidences of an infected tumor, is an uncommon secondary event and its presence should be the indication for cystoscopic study to determine the exact nature and location of the infection.

Malignant tumors, especially carcinoma of the cervix, frequently produce vesical symptoms due to direct extension of the growth to the bladder or secondary to renal infection incident to incomplete occlusion of the ureters. Passing over the extensive bladder changes and symptoms common to advanced cases of cervical cancer, it is worthy of note to emphasize the value of cystoscopic study in the presumably early cases, for by this means one may find data of value in determining operability. This applies particularly to the cervicofundal type of growth which to external appearances offers a favorable operative result; on cystoscopic examination, however, one may find changes in the bladder wall indicating an extension of the growth beyond the confines of the uterus, in which operation would be a futile procedure.

The majority of cases of acute pelvic infection, with associated vesical symptoms, present little or no difficulty of interpretation, due to extension by continuity along the urethra or to direct contact between the bladder base and the diseased structures; here, cystoscopic studies are not only unnecessary but often inadvisable. In the chronic cases, however, the presence of persistent bladder irritability is certainly an indication for such investigation to determine the nature and extent of the disease, whether it has arisen as a purely secondary manifestation or is a coincident lesion, independent of the primary pelvic

Digitized by Google

infection and to what degree, if any, the ureters and kidneys are sharing in the production of symptoms.

Passing over without comment the ordinary evidences of chronic urethral and bladder infection, we shall consider briefly a few observations relative to an associated ureteral and renal involvement.

In their course along the lateral pelvic walls, but especially through the broad ligaments, the ureters are brought into such intimate contact with infections of the uterus and its adnexa that their participation in the disease would seem a most likely as well as a common occurrence, arising either from direct extension of the process in cases of acute infection or from compression incident to contraction of a pelvic exudate in the chronic cases. Our experience has been, however, that while such potentialities are present, their actual occurrence is not common, for in only a few instances have we been able to demonstrate a stricture of the ureter or a pyelitis which we could look upon as the result of an associated pelvic infection.

The diagnosis of a secondary pyelitis is not warranted unless definitely established by careful cystoscopic studies, for occasionally an acute pelvic infection may present the symptoms of renal involvement, and yet such does not exist. In five of these cases we have found the ureters and kidneys normal both anatomically and functionally, with sterile cultures of the urine. One case with a large pelvic abscess subsequently developed a perinephritic abscess; in the others, the renal symptoms rapidly disappeared with the subsidence of the pelvic infection. Here we were unquestionably dealing with a perinephritis and not a true renal infection arising from the primary focus in the pelvis.

Hunner has called attention to the frequency of ureteral strictures which may give rise to vesical and renal symptoms and which occur secondary to infections within the pelvis or in more distant structures. While we are not in full accord with his views on the subject, we are of the opinion that he has opened up an interesting field of investigation, and that in obscure cases of protracted vesical irritability and pain, this lesion must always be considered and appropriate measures used to satisfactorily eliminate its presence.

Our studies have been made in the types of infection commonly seen in a gynecologic service and do not include in any great number the acute puerperal infections which, from the nature of their pathology, offer ideal conditions for the development of renal complications and in which such complications are often encountered.

In cases of extensive prolapsus and cystocele, the symptomatic manifestations of impaired bladder function are primarily mechanical in their origin, but later may be modified by the addition of an infection, the invasion of which is made easy by the distorted anatomy of the urethra and bladder. The interpretation of the symptoms which these

Digitized by Google

patients give, such as incontinence, frequency, retention, etc., is readily demonstrated by cystoscopic examination, and the findings are more or less uniform, differing only in degree. The urethra shares with the bladder base in its loss of support and because of the sagging of its posterior segment, the canal assumes a direction more vertical than horizontal; there is also dilatation of the posterior urethra with an attenuated, edematous sphincter, irregular in outline and showing pseudopolypi projecting from its edge. There is not only a sacculation of the bladder base but an actual descensus of the trigone along the anterior cervical wall carrying the ureteral orifices to a lower level than normal. The mucosa of the trigone is edematous and its blood vessels are deeply engorged. Thickening of the muscularis is evidenced by widespread trabecular hypertrophy. Some degree of retention is common in large cystoceles and this stagnation invites infection which modifies the picture by the changes characteristic of cystitis.

The study of these cases is not complete until one has determined to what extent, if any, the ureters and kidneys have become affected by the distortion of the bladder. The descensus of the trigone necessarily carries with it the terminal portions of the ureters and this traction and torsion may lead to partial obstruction of the ureteral lumen, resulting in a hydroureter or hydronephrosis. It is a common experience to find catheterization of one or both ureters difficult or even impossible in cases of large cystocele and prolapsus uteri since the catheter tip meets an obstruction one or two centimeters from the meatus, but on reducing the cystocele by inserting a tampon in the vagina, the angulation of the ureter is removed and catheterization proceeds without difficulty. The demonstration of such an obstruction by no means indicates a functional impairment of the ureter, for in several of these cases we have shown by pyelograms the angulation of the ureter with a normal lumen above it. On the other hand, a potential obstruction is present, which, with increase in the mechanical factors or in the presence of infection, may be converted into an actual obstruction, giving rise to the typical symptoms of hydronephrosis or pyelitis as the case may be. Such symtoms often show a definite relationship to menstruation and are due to the increased edema of the trigone which serves as an additional factor in occluding the intravesical portion of the ureter.

In concluding this portion of our paper, we would refer to the association of vesical symptoms with an uncomplicated anteflexion or retroflexion of the uterus. Contrary to the generally accepted teaching, we are of the opinion that the malposition *per se* is rarely, if ever, productive of vesical irritability, for our experience has shown that the origin of such symptoms is to be explained by a lesion along the

Digitized by Google

urinary tract, and is in no way dependent upon pressure which the uterus may make upon the bladder base.

With this résumé of vesical lesions which may arise as the direct result of pelvic pathology, let us pass to another and by no means less important phase of the subject, viz., the recognition of complicating lesions within the urinary system, the pathology of which is entirely independent of that within the pelvis. The symptoms of both may be limited to those of deranged bladder function and here again their interpretation must depend entirely upon cystoscopic studies. In many instances incomplete and, indeed, often unnecessary, operations had been performed upon these patients due to hasty conclusions based merely upon the clinical history and pelvic examination.

In conclusion, we cannot emphasize too strongly the importance of making cystoscopic examinations in all gynecologic cases presenting vesical symptoms, even though the condition may seem quite sufficient to explain these symptoms. Not infrequently, by such a plan, lesions will be discovered which were unsuspected and which are of more vital import than those of the pelvic organs.

DISCUSSION

DR. JOHN O. POLAK, BROOKLYN, NEW YORK.—I think this presentation of Dr. Keene's demonstrates how important it is to include cystoscopy in the department of gynecology and have it intimately related to the work of that department.

There is only one point I want to speak of in the discussion which Dr. Keene passed over casually, and that is the effect of parametrial inflammations on the urinary tract as the result of the contraction that takes place in the scar of a parametritic infection. In other words, a very large number of patients complaining of gynecologic symptoms give a history of the pain being referred to one side, and on ureteral examination there is found to be a difference in the function of the two kidneys. The kidney on the side where the cicatrix is, even though the stricture is not very pronounced, has a tendency to develop frequently intermittent pyelitic symptoms and the drainage is different on the two sides. With the relief of that we have not infrequently seen these symptoms disappear.

There is one question I would like to ask Dr. Keene, namely, does a marked retroflexion change the shape of the ureteral orifice?

DR. BROOKE M. ANSPACH, PHILADELPHIA, PENNSYLVANIA.—I have seen some of the work of Dr. Keene and would emphasize the importance of cystoscopy in connection with gynecologic practice. In a large proportion of pelvic cases there are bladder symptoms, and I make a practice of obtaining a catheterized specimen of urine from every patient for urinalysis. This may seem to be a simple matter to the men of this Society, but in outside consultation practice, unless insisted upon, pains are not taken to obtain a catheterized specimen, and voided specimens being contaminated with leucorrheal or menstrual discharge may be more or less valueless.

Sometimes the pelvic condition is drawn to our attention first by vesical or kidney symptoms. I recall one case of fibroid tumor in which the symptoms resembled those of a stone in the bladder, and another fibroid tumor of which the first symptoms were a kidney crisis.

As to whether an acute retroflexion of the uterus alone can produce vesical

Digitized by Google

symptoms, I am at some variance with the opinion expressed by Dr. Keene and believe it often does, and that the symptoms result from the pressure or traction of the displaced cervix upon the base of the bladder. Such symptoms are promptly relieved by restoring the uterus to a normal position.

It is not uncommon to get cases of cystitis and pyelitis associated with pelvic disorders in which the predisposing cause is a stasis of urine from distorsion of or pressure upon the ureters or bladder. A colon bacillus infection takes place secondarily. Very slight pressure on the ureter is sufficient to cause stasis of the urine in the ureter. The secondary infection will usually rapidly disappear as soon as the basic lesion is relieved, and sometimes no more treatment of the ureter is needed than simply the passage of a catheter.

DR. ROBERT L. DICKINSON, BROOKLYN, N. Y.—The cystoscope can be used by the gynecologist as part of his routine examination in every case that has an irritable bladder or bladder symptoms, using preferably the small Broedel instrument. It causes very little or no pain to the woman and one gets a good view of the bladder base with it and can determine whether or not further measures are necessary.

As to the frequency of urethritis of mild type in women with congested bladder base, one gets very good results from using a gloved stretcher dilator, not the ordinary dilator, because the meatus is smaller than the rest of the urethra, but of the type I have mentioned. This with simple applications to the bladder base, gives us in the important cases Dr. Keene described this morning a very large number of cures and the relief is out of all proportion to the amount of work we have to do. There is no use in sending such cases to the cystoscopist if that simple treatment relieves them.

DR. ARTHUR H. CURTIS, CHICAGO, ILLINOIS.—I have been impressed with the fact that after operations one of the most frequent troubles we have is the retention of urine. I would like to ask Dr. Keene how frequently he has encountered this trouble, and what his measures are for relief; whether he catheterizes once or several times, and if he does catheterize, does he continue to do so until residual urine disappears.

DR. EDWARD H. RICHARDSON, BALTIMORE, MARYLAND.—Urology in women is an integral part of gynecology, as well as is general abdominal surgery. These three branches of surgery belong together and are inseparable, and Dr. Keene's slides and his paper illustrate forcibly how frequently they are associated. Any one who attempts to practice gynecology without the use of the cystoscope as a routine procedure is going to miss perhaps the most interesting group of cases which present themselves with pelvic lesions.

I agree with Dr. Keene in his statement that uncomplicated retrodisplacement of the uterus is not an important factor in the production of vesical symptoms.

One type of case which Dr. Keene mentioned, so far as my experience goes, is unique, and that is the case presenting a large fibroid associated with hematuria in which was found a condition approaching a papillomatous growth over the dome of the tumor in the bladder. I would like to ask Dr. Keene whether he made a microscopic section of that particular portion of the tumor which was protruding into the bladder, and if so, whether or not it turned out to be an adenomyoma. We know of the invasive character of adenomyoma and that clinically at least it is a malignant tumor. The association of hematuria from the mere pressure upon the bladder of the fibroid tumor is certainly an exceptionally rare occurrence. It suggests strongly, therefore, that this tumor may have been an adenomyoma with actual invasion of the bladder wall by the growth, and that the papillomatous ap-

Digitized by Google

pearance on the bladder wall, if examined microscopically, might have shown endometrial elements.

DR. GEORGE GRAY WARD, JR., NEW YORK CITY.—Since Dr. Curtis made his valuable contribution on retention of urine after operation, I have been in the habit of making it a routine in my division in the Woman's Hospital in all the extensive bladder operations, to catheterize at once after the patient voids until the bladder demonstrates that it can completely empty itself. There is no question in my mind from the experience we have had that this is one of the ways of avoiding postoperative trigonitis, which is I think more common with these patients than one realizes. I simply wish to emphasize the great value of this prophylactic measure.

DR. HENRY T. BYFORD, CHICAGO, ILLINOIS.—Ordinary retroversion, without other complications than relaxation of the posterior supports, seldom causes symptoms. When there are symptoms there is usually more or less prolapse with relaxation of the connective tissue anteriorly, or some other pathologic condition in the pelvis.

DR. KEENE, (closing).—Dr. Polak has brought up an important point, namely, the incidence of partial strictures of the lower portion of the ureter in cases of old parametritis. I think that is a point one should investigate in distinguishing left sided symptoms in patients that have been operated upon as well as in cases of chronic infection. In these cases the symptoms, especially those of blockage, are usually associated with the menstrual period. As a rule, the symptoms are premenstrual in type occurring during the height of premenstrual congestion and are due to a partial occlusion of the terminal portion of the ureter. One observer has drawn attention to what he calls renal dysmenorrhea in which the pain is always lateral, due to the fact that there is a partial obstruction of the ureter giving rise to renal colic.

With reference to the remarks of Dr. Anspach as to the question of obstruction associated with an uncomplicated retroflexion, my experience has been that such does not occur.

With regard to the question of Dr. Curtis, we follow his technic in our service. These cases are catheterized as he has recommended and we find it of the greatest value.

Dr. Dickinson brought out the point of the case with which patients can be examined by using a very small cystoscope, for it means nothing more than passing a catheter, so far as discomfort of the patient is concerned. It takes three minutes, and one determines definitely the nature of the underlying pathology. This fact of dilating the urethra is of enormous value. We meet so often cases at or about the time of the menopause of what we call the climacteric bladder in whom there are marked symptoms; one finds a normal urine, a little edema, with perhaps small cystic formations in the trigone, changes so small as to be out of all proportion to the severity of the symptoms which are presented. In such cases remarkable relief often follows the examination and complete relief may be obtained by repeated urethral dilatations.

In answer to Dr. Richardson's question regarding the nature of the tumor, it was not an adenomyoma extending to the bladder. I quite agree that hematuria in association with a benign tumor of the uterus is most unusual, but in this case I am quite sure that such did occur for the bleeding ceased immediately after operation and did not recur.

Digitized by Google

CERTAIN DIETARY FACTORS IN THE CAUSATION OF STERILITY IN RATS

By Edward Reynolds, M.D., and Donald Macomber, M.D.†
Boston, Mass.

ANIMAL breeders have long held that glossy coat, clear eye, firm muscles, etc., were essential to successful reproduction and have attempted to obtain this state, which they call "good breeding condition," by grooming, graduated exercise, and special diets which, in all species, they habitually make high in proteins.

Our clinical experience with sterile human couples early led us to notice the frequency of poor general condition in one or the other of the partners and brought us to the question of how far many sterilities may be due to the evident absence of "good breeding condition" in these individuals. Reading along this line led us to the study of the dietary work of McCollum,[1] Osborne and Mendel[2] and others. We noted their observations that diets deficient in certain important elements have resulted in lowered fertility. These elements are the mineral salts which are characteristic of the ash of all animals, of which calcium is the most important, a sufficient amount and variety of the proteins, and the substances which are generally known by the somewhat unfortunate name of vitamines and are classified as the fat soluble A vitamine, the water soluble B vitamine, and the antiscorbutic vitamine.

Personal interviews with McCollum and Mendel, their suggestions, and still kinder offers of assistance, then led us to the experimental work on which this paper is founded.

We were fortunate in obtaining an opportunity to work in the genetic laboratory of Castle at the Bussey Institution of Harvard University and gladly acknowledge our great indebtedness to his advice and instruction.

The deficiency diets were planned for us by McCollum to produce sterility without marked loss of health in adults or extreme underdevelopment in growing individuals and the general condition of the animals so dieted has been watched carefully by weight charts (Figs. 6 and 7).

The fertility or infertility of the animals so treated has been established by matings and rematings under varying conditions and from time to time the testicles and ovaries from individuals on each diet have been sub-

†Read by Dr. Macomber, by invitation.

Acknowledgment is made of financial aid received through the kindness of the Trustees of the Elizabeth Thompson Science Fund.

Digitized by Google

TABLE I

COMPOSITION OF DEFICIENCY DIETS

DIET LOW IN FAT SOLUBLE VITAMINE		DIET LOW IN CALCIUM	
Rolled oats	40.0	Whole wheat	67.5
Gelatine	10.0	Casein	15.0
Casein	5.0	Whole milk powder	10.0
Salt Mixture (McCollum)	3.7	Sodium chloride	1.0
Dextrine	40.3	Inert substance	1.5
Cod liver oil	1.0	Cod liver oil	5.0

DIET LOW IN PROTEINS		DOUBLE DEFICIENCY (WAR) DIET	
Wheat	70.0	Wheat	60.0
Salt mixture (McCollum)	3.7	Sodium chloride	1.0
Dextrine	21.3	Inert substance	1.5
Cod liver oil	5.0	Dextrine	32.5
		Cod liver oil	5.0

It will be seen that each diet in this table contains an ample supply of all essential elements with the exception of the one for which it is designed to be deficient.

TABLE II

CHEMICAL ANALYSIS OF DIETS

	STOCK DIET	LOW FAT SOL. VITAMINE	LOW CALCIUM	LOW PROTEIN	DOUBLE DEFICIENCY OR WAR DIET
Protein	18.0	19.6	23.4	8.4	7.1
Fat	10.1	3.8	6.7	6.5	6.3
Carbohydrate	55.3	63.1	53.6	69.5	72.3
Salts	4.7	4.5	2.6	5.0	2.1
Fiber	0.9	0.9	2.7	1.3	2.6
Moisture	11.0	8.1	11.0	9.3	9.6

By comparing the various diets as to chemical constituents it will be noted that they are all adequate except for the designated deficiencies.

TABLE III

VITAL ANALYSIS OF DIETS

	STOCK DIET (AMPLE IN ALL ELEMENTS)	LOW FAT SOL. VITAMINE	LOW CALCIUM	LOW PROTEIN	DOUBLE DEFICIENCY (LOW IN CALC. AND PROTEIN)
Protein	18.0	19.6	23.4	8.4	7.1
Fat. Sol. Vit.	5.0*	1.0*	5.0*	5.0*	5.0*
Calcium	1.8	1.88	0.03	1.88	0.03

The amount of the fat soluble vitamine cannot be determined by chemical analysis. The figures given represent the amount of the vitamine containing substance.

*Estimated.

jected to serial section and histologic study. Here we must express our gratitude and indebtedness to Bremer of the Harvard Medical School in whose laboratory and under whose direction the histologic work has been carried out. The work is still in progress, but has already yielded some results which will be touched on later (Figs. 8 to 14).

The composition of the diets used is shown in Table I and their analyses in Tables II and III, but lack of space forbids a full discussion of their details in the text. All the diets were fed in unlimited amount, an ample supply being continually before the animals. The stock

Digitized by Google

diet of the laboratory on which Castle's rats have shown an exceptionally high fertility, and which we used as a check diet, differs from the others in that it offers a certain element of choice in accordance with individual appetites, being always present in two forms, a powdered dry mash and a bread, or cake, similar to dog bread. The rats consume on the average equal quantities of each and the analysis of the stock diet as a whole in Table II, is based on this fact. The deficiency diets were fed in powdered form only (dry mash) and were therefore invariable. In selecting a low percentage of the fat soluble A vitamine, of calcium and of proteins for the three diets to be experimented with we were guided by the fact that these are the three vital substances in which deficiencies are most frequently observed in human beings in this country. The deficiencies in the water soluble vitamine and the antiscorbutic vitamine are rare in western civilized life and are moreover disease-producing. They were therefore omitted. To the three diets selected we added a fourth, a diet deficient in both calcium and protein, on the ground that it is at least a partial representation of the war and postwar diets from which portions of Europe have been, and are even now, suffering. This double deficiency is therefore of human interest at this moment.

The rat was selected as the experimental animal mainly for convenience, as an omnivorous animal with a digestion closely comparable with that of our own species, and as being singularly free from any of the diseases or abnormalities which produce sterility. This makes it especially useful for a study of the production of the functional decreases of fertility which was the object of this work. We used a strain of Albino rats which had been inbred by brother and sister matings with selection for health and strength for thirty-four generations by Helen D. King[3] of the Wistar Institute. This strain is especially valuable for experimental work on account of its extreme genetic uniformity. King reports that 80 per cent of their matings have been fertile in her laboratory where the diet is very varied. On the stock diet of Castle's laboratory without selection it has been 65 per cent.*

These rats were subjected to the deficiency diets without any other change in their life conditions. Rats on each of the diets were then bred together and the results were checked by breeding the same individuals with rats of known previous fertility from Castle's stock. As more than 96 per cent of Castle's rats are fertile, individuals of previously proved fertility from this strain have been here considered as possessing 100 per cent fertility.

We think that our experiments have already shown that dietary

*It should be noted that King in maintaining her strain has bred from her best rats, while we, necessarily, bred all our rats without distinction.

Digitized by Google

TABLE IV

RESULTS OF MATINGS ON VARIOUS DIETS (KING x KING RATS)

DIETS		NO. OF MATINGS	NO. OF POSITIVE MATINGS	PERCENTAGE OF MATING FERTILITY	PERCENTAGE OF INDIV. FERTILITY
Stock diet		23	15	.65	.81
Low Fat Sol. Vitamine diet	Proved	8	4	.50	.70
	Unproved	13	4	.31	.55
Low Calcium diet	Proved	0	0		
Low Protein diet	Unproved	7	1	.14	.37
	Proved	0	0		
Double Deficiency diet	Unproved	5	0		
	Proved	3	0		
(Low in calcium and protein)	Unproved	5	0		

This table shows the result of matings in which both partners were King rats and both were on the indicated diet.

deficiencies which are too slight to produce ill health or even marked loss of condition nevertheless result in a high percentage of infertile matings; they also show that many of the individuals which compose these infertile matings are capable of reproduction when remated to highly fertile individuals; they suggest that the degrees of infertility so produced can be measured with fair accuracy; and that a threshold of fertility below which reproduction does not occur can be approx-

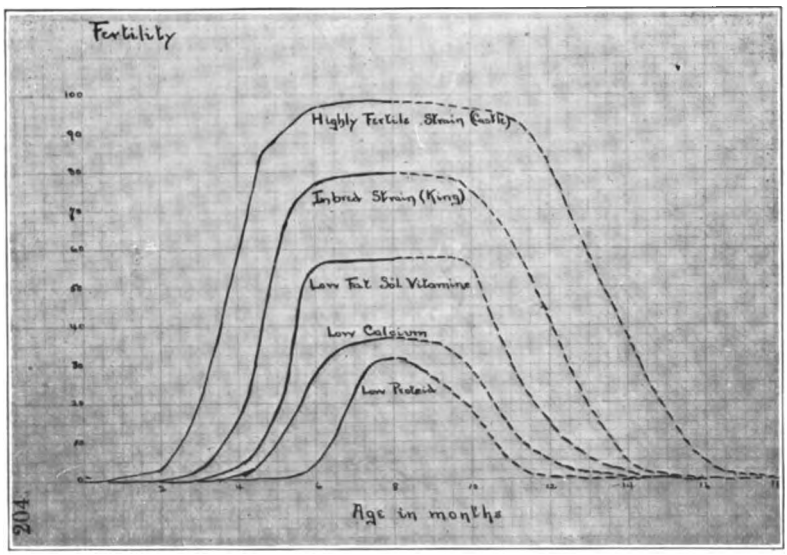


Fig. 1.—This chart combines percentage of fertility with the age at which reproduction first occurred for Castle rats; for King rats; and for rats on the three single deficiency diets. The dotted half of each curve does not represent actual observations, but conforms roughly with the sexual life of these animals. The sharp rise corresponds to puberty and the sharp fall to the cessation of sexual activity. Note that the effect of deficient diet is to shorten and depress each curve as a whole.

Digitized by Google

TABLE V

RESULTS OF RE-MATINGS ON VARIOUS DIETS (KING x CASTLE RATS)

DIETS		NO. OF MATINGS	NO. OF POSITIVE MATINGS	PERCENTAGE OF MATING FERTILITY	PERCENTAGE OF INDIV. FERTILITY
Stock diet		10	7	.70	.70
Low Fat Sol. Vitamine diet	Proved	0	0		
	Unproved	20	9	.45	.45
Low Calcium diet	Proved	0	0		
Low Protein diet	Unproved	19	6	.30	.30
	Proved	0	0		
Double Deficiency diet	Unproved	12	6	.50	.50
	Proved	0	0		
(Low in calcium and protein)	Unproved	0	0	0	0

This table gives the results of remating rats from the negative matings of Table IV with Castle rats of known fertility. Since such Castle rats are of practically 100 per cent fertility the index of average individual fertility of their King rat partners is the same as the index of mating fertility. It will be seen that the individual fertilities of rats on the deficiency diets are so low as to have insured sterile matings with partners of the same grade (see Table VI).

imated. Complete proof on these two latter points will, however, require larger numbers than we have so far employed.

The effect of these diets on the fertility of the individuals concerned is given in percentages in the column headed Mating Fertilities in Table IV. We intended to test all the deficiency diets both on rats which had been previously fertile when on stock diet, and on rats reared to maturity on the experimental diets, but accidental deaths and other laboratory accidents in connection with the small supply of stock available at the start made the number of previously fertile rats which were mated on the two diets which were deficient, respectively, in calcium and in protein, too small to warrant a report. These results are also shown graphically in Fig. 1 in which the curves show both the age at which fertility occurred and the degree of fertility which was finally attained on each diet.

When the diet deficient in the fat soluble vitamine was given to rats which had been fertile while on the stock diet, it produced a decreased fertility which is probably too slight to be used statistically from so small a number of matings. It is included in the table for what it is worth, but will not be discussed further. When, however, young animals were reared to maturity on this diet and then mated, their fertility was decreased by more than one half (0.31 as compared with 0.65). (See Table IV.)

The diet which was deficient in calcium and the diet deficient in the proteins both decreased fertility to an amount which is noteworthy even from a limited number of experiments, as is shown in Table IV.

Digitized by Google

In the rats subjected to the double deficiency diet (decreased calcium and protein) there were no pregnancies at all either in previously fertile adults or in rats reared to maturity on the diets.

The results were then checked by remating these individuals with rats of proved fertility from Castle's highly fertile stock as shown in the column of mating fertility in Table V. The results obtained were at first sight altered, but this is due to the high fertility of the partners. They were in fact confirmatory of the percentages given in Table IV, as will be apparent on discussion of the percentages of "average individual fertility" to be taken up now.

Study of these results made it at once evident that in any discussion of the sterile matings produced we must make a distinction between the "mating fertility" of a class and the "individual fertility" of the several animals concerned.

The percentages of individual fertility given in Tables IV and V of course represent the average of individual fertility throughout each class, and this must again be distinguished from the individual fertility of given animals which can only be arrived at by individual testing.

Let us consider the results in detail. On the calcium deficiency diet 6 out of 7 matings were sterile, i.e., the class showed 14 per cent of fertility as compared to 65 per cent on the stock diet. This diet was deficient only in its percentage of calcium and was otherwise an abundant and nourishing diet. It did not produce visible ill health.

On the protein deficiency diet there were only 5 matings and no pregnancy occurred. It is probable that on a larger number of matings there would have been an occasional positive mating and a possibility of calculating their rating. This is supported by the fact that some of these rats were subsequently fertile to rats of higher fertility (Table V).

On the double deficiency no pregnancy was ever obtained in these matings.

The production of so much infertility by such slight change in conditions is at first surprising, but it is rendered much more comprehensible by the theorem which we now wish to bring forward, that a slight decrease of fertility in each of the individuals concerned produces a much greater decrease of fertility in the matings.

If in this connection we make certain assumptions, calculate from them the fertilities which should theoretically be produced, and on turning to the actual results of the breeding experiments, find that the same, or closely similar, percentages were in fact obtained, we may fairly conclude that the assumptions are sustained, in so far at least as the small numbers used warrant any conclusion.

We will assume then that the fertility of a mating may be fairly expressed as the product of the individual fertilities of the individuals concerned, and in written form by the formula

Digitized by Google

The fertility of the male x the fertility
of the female=the fertility of the mating
or, for brevity — m x f = M

TABLE VI

SCHEMATIC CHART OF FERTILITY

INDIVIDUAL FERTILITY		MATING FERTILITY
1.0 x 1.0		1.00 or 100%
.9 x .9		.81 or 81%
.8 x .8		.64 or 64%
.7 x .7	Threshold for	.49 or 49%
.....		.....45%
.6 x .6	Reproduction	.36 or 36%
.5 x .5		.25 or 25%
.4 x .4		.16 or 16%
.3 x .3		.09 or 9%
.2 x .2		.04 or 4%
.1 x .1		.01 or 1%

The figures in this table vary from those actually obtained from the matings only in being restricted to even tenths for the sake of clearness. The establishment of .45 as the threshold for reproduction must of course be regarded merely as an approximation until larger numbers have been employed.

We will assume that when individuals of the same parentage have been reared under the same life conditions and subjected to the same change in those conditions, their fertilities will be affected in substantially similar degree whether the individual is male or female. Then if in a given class we make 10 matings, of which 5 are fertile, the average mating fertility of this class would be 5 and the formula would be $m \times f = .50$, but if in this formula both individuals are of equal fertility it follows that the fertility of either individual is equal to the square root of .50. The square root of .50 is approximately .7 ($.7 \times .7 = .49$); hence if our assumptions are correct the formula for a class in which 10 matings give 5 fertilities would be $.7 \times .7 = .5$.

Study of a number of such formulæ leads, however, to a further theoretical conclusion,—that somewhere in such a series there must be a point above which reproduction may be expecetd, but below which it will not occur, a "threshold for reproduction" (Table VI).

If we now apply these formulæ to the 23 matings of Dr. King's rats on our stock diet we obtain the following results. There were 31 individuals involved in these 23 matings. In the case of 22 individuals the first mating resulted in prompt reproduction. We may safely conclude that these individuals were of the average mating fertility of King's strain which she gives as .8 (the square root of .8 is .9, $.9 \times .9 = .81$) which may then be taken as the individual fertility of these 22 rats. The other 9 individuals all eventually reproduced, but in their case the number of matings required before a result was obtained varied from 2 to 7. Estimating their individual fertilities by the same method, i.e., by the percentage of mating fertility in the whole

Digitized by Google

group of matings in which the individual was concerned, and taking the square root of the mating fertility as the fertility of the individual, adding the individual fertilities of the whole class and dividing by 31 we get an average individual fertility of .82 for the whole group of 31 rats. If these assumptions are correct, or nearly so, this figure (.82)

Fig. 2.—Stock diet.

Fig. 3.—Low fat solution. Vitamine diet.

Fig. 4.—Low calcium diet.

Fig. 5.—Double deficiency on war diet

should approximate that obtained by taking the square root of .65 which was our observed index of mating fertility in this class (Table IV). This square root is .81, and the comparison is close enough to warrant the assumption.

The same method was pursued in the establishment of a threshold

Digitized by Google

for reproduction. Taking the total number of matings in which any of these rats figured, which is 33, the appropriate individual index was introduced into the equation for each mating. This gives us a table of mating fertilities ranging from .28 to .90. In some of these matings young were produced; in others there were no young, or, as we have phrased it, some matings were positive and others negative. The column of mating fertilities in Table VI gives in schematic form the results obtained. In practically all the matings which fall above the dotted line young were produced; in practically all those which were below the dotted line the matings were infertile.

In fact, if we so place this "threshold for reproduction" at a mating fertility of .45 there were but two exceptions to the rule. In one case

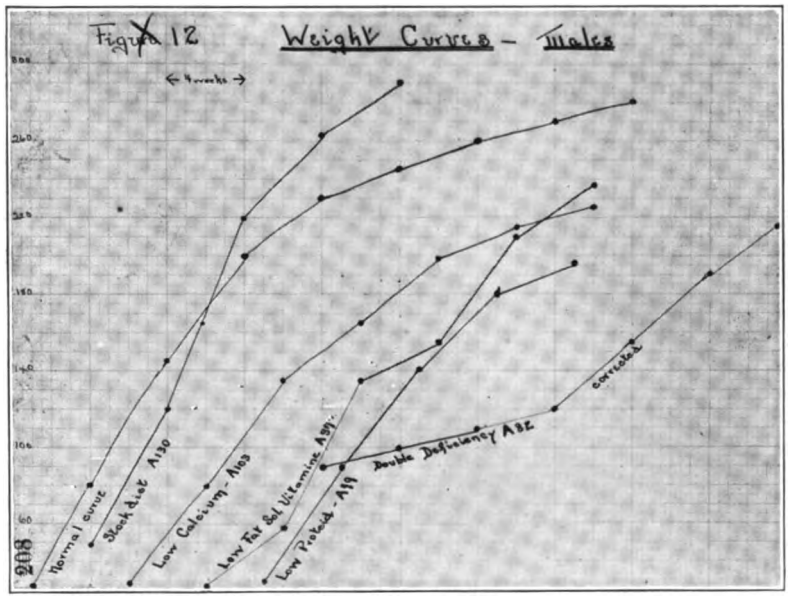


Fig. 6.—Individual weight curves for males.

young were produced in a mating with an index of .40, but in this case it was the seventh mating to which that individual rat had been subjected, the six others being infertile. In one case a mating with an index of .49 did not produce young, but this mating was a brief one. It was made and terminated before this point had come into our minds and might have proved fertile if it had been longer continued.

We fully realize that this theory must be marked unproved until it has been tested by a much larger number of matings. We are already engaged, in conjunction with Castle, in repeating these experiments on a scale large enough to be evidential, and shall report the results with him in a later paper. We would only say here that if it is reliable it explains very many otherwise inexplicable facts; for

Digitized by Google

instance, the often repeated observation that two rats mated with each other failed to produce young, but that when each was remated with a partner of higher individual fertility (e.g., a Castle rat) both matings proved positive.* On this theory the explanation is evident. Suppose the rats concerned in a class each had an index of individual fertility of .6, the mating fertility in that case would be .36, which is below the threshold for reproduction and no young would result; but in their rematings with rats whose individual fertility was 1.0, the mating fertility in each case would be .6 and young would result. Again it makes it easier to understand the otherwise extraordinary fact that a merely decreased percentage (not an absence) of calcium

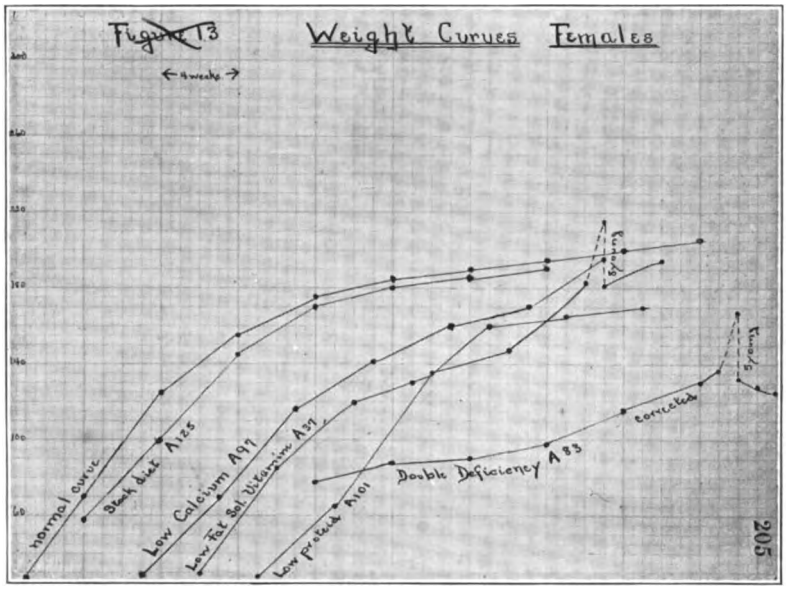


Fig. 7.—Individual weight curves for females.

without any other change in the conditions of life can (at least in rats) make 6 out of 7 matings sterile, (or the similar results in the other classes). It has long been known in the laboratories that animals subjected to highly deficient diets become sterile before they develop ill health. These experiments show that even moderately deficient diets decrease fertility and if this theory is true it explains how a moderate decrease of fertility in each of two individuals must make their mating sterile, as, for instance, $.6 \times .6 = .36$ or sterility.

It is, of course, to be remembered that if a class shows a mating fertility of about .36 this means that 4 matings out of 10 have been fertile. The explanation of the occurrence of these 4 fertile matings

*Thirty-seven individuals which had had negative matings reproduced with new partners.

Digitized by Google

with an average individual fertility of only .6, of course, means that with an average fertility of .6 some individuals will be at .7 or higher and that whenever two such individuals meet their mating will be

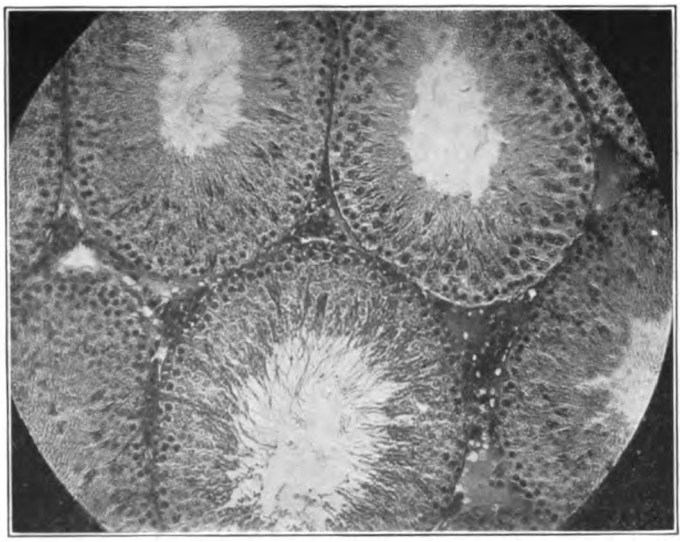


Fig. 8.—Section of testis (x500) from rat made sterile by low fat solution. Vitamine diet.

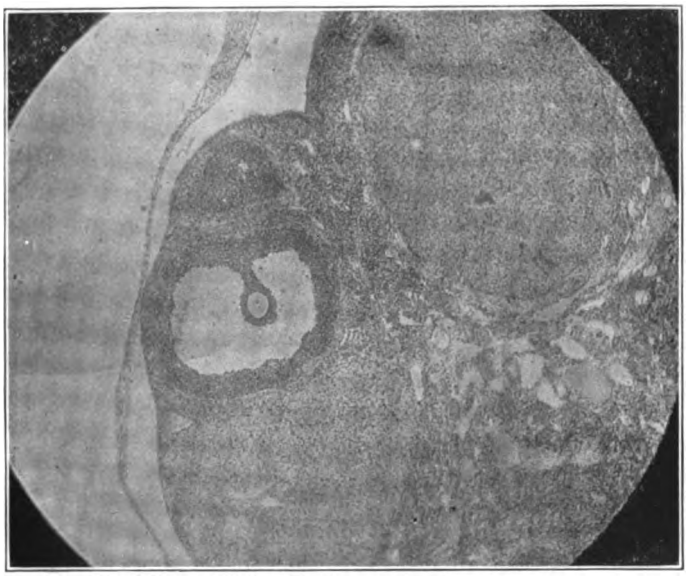


Fig. 9.—Section of ovary (x300) from rat made sterile by low calcium diet.

fertile. Other individuals will be as low as .5 and would probably be sterile when mated with even the best of the class, e.g., .8 × .5 = .4 = sterility.

One other observation of some interest may be mentioned here.

Digitized by Google

We have been unable to find any mention of the birth of macerated fetuses in the literature and Castle is sure that he has seen no such instance in the many years during which his laboratory has contained

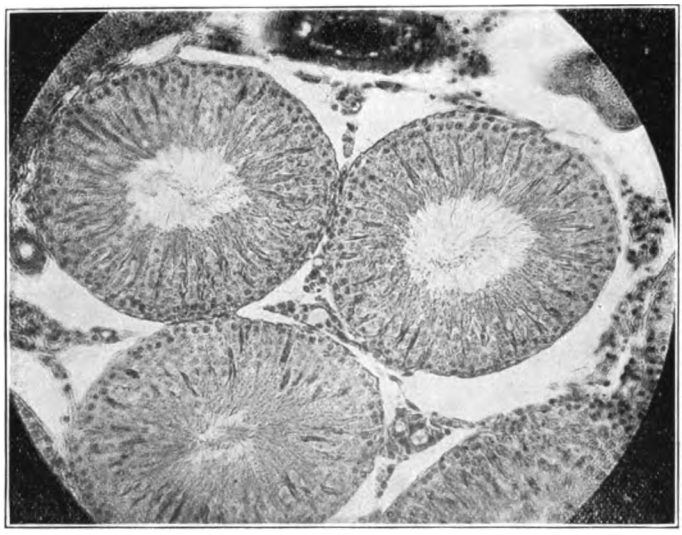


Fig. 10.—Section of normal testis (x500).

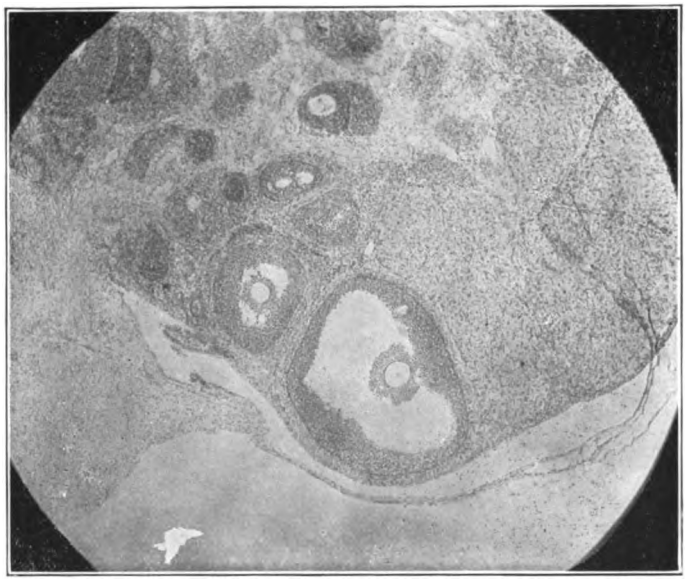


Fig. 11.—Section of normal ovary (x300).

large numbers of rats on stock diet. In 32 matings on our single deficiency diets 4 such deliveries occurred and there were 2 more in 8 deliveries in which young rats which had been reared on the war diet

Digitized by Google

were subsequently placed on ample diet and bred to Castle's rats. The possibility that habitual abortion in the human race may be the result of one of the deficiencies in these vital ingredients of diet which are

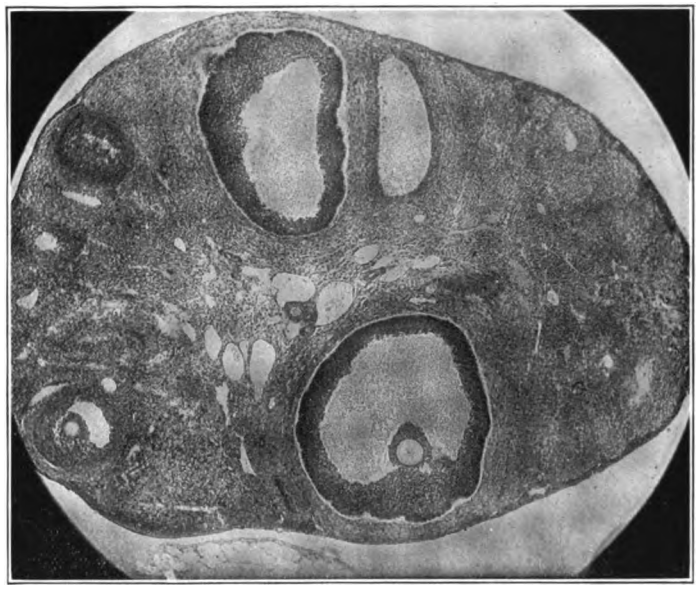


Fig. 12.—Section of ovary (x300) from rat made sterile by war diet.

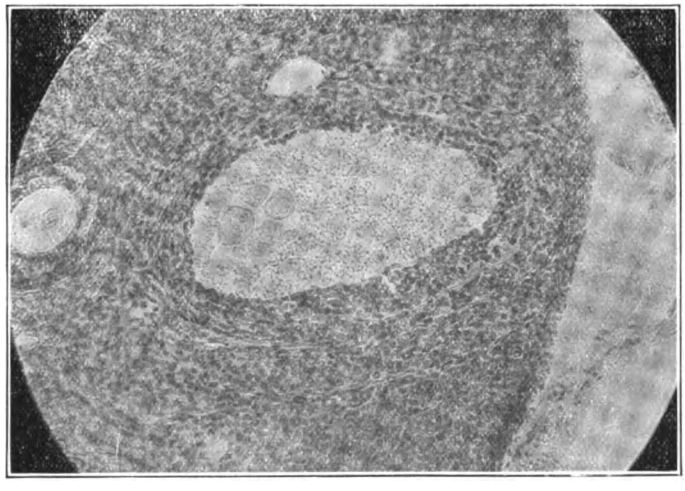


Fig. 13.—Section of ovary (x500) from rat made sterile by war diet. Note the four cells in the follicle.

not infrequently present as a result of faddism or lack of appetite, even in the well fed classes, should be given consideration. We have observed one instance in which five successive abortions occurred in a

Digitized by Google

woman whose diet when analyzed showed such a deficiency, but in whom a sixth pregnancy on corrected diet resulted in a normal child at term.

The work of Steenbock[4] of the Wisconsin Experiment Station shows that calcium deficiency tends to produce abortion and stillbirth in swine and cattle also.

We have stated that the deficiency diets produced no disease or evident ill health (with the exception of the war diet which did produce wasting and in several instances death). Figs. 2 to 4 are photographs of representative rats from each class and are the best evidence of this fact which we can produce on paper. The condition of representative individual rats in each class is further shown by Figs. 6 and 7 which give their individual weight curves. It will be seen that on the single

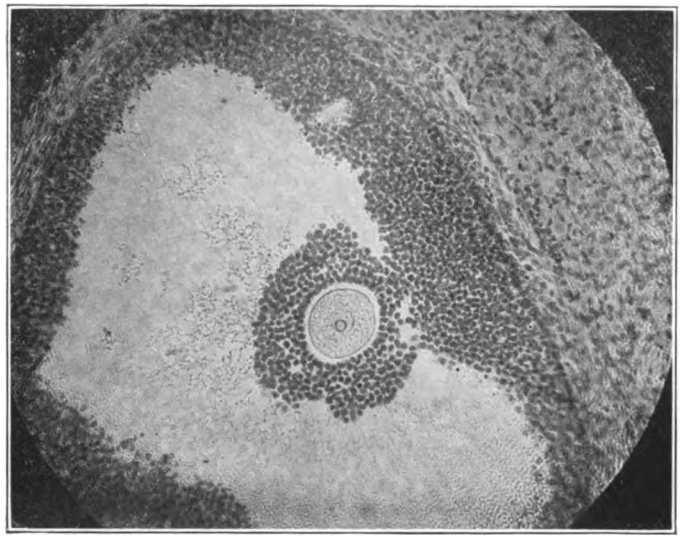


Fig. 14.—Section of normal ovary (x500).

deficiency diets these vary extremely little from the average normal curve of rats and from the slightly better curve obtained from our stock diet.

The photographs (Fig. 5) and the individual weight curves of rats on the double deficiency diet (low in calcium and protein) show these rats to be in less good health, and this marked change of condition was attended by great loss of fertility, all their matings with each other proving sterile. We have obtained European statistics which show a corresponding decrease in human fertility in the countries of central Europe, notably in Austria, but lack of space forbids the reproduction of these statistics in this paper.

It seemed necessary for completeness that we should study the ovaries and testicles of rats which had been decreased in fertility by these

Digitized by Google

diets. Since we were able to find no extended study of the physiologic condition of the ovaries and testicles of rats in a state of fertility our study of these organs in rats on deficiency diets was necessarily preceded by the preparation of serial sections of the entire ovary and testicle from stock diet rats in every month from birth to full maturity. With these as standards we compared serial sections of the organs from representative rats in each of the classes which were on deficiency diets. The work of Robinson[5] on prenatal death makes it probable that certain ova, and probably certain spermatozoa, contain within themselves conditions which make complete development impossible; but these conditions may, or may not be, morphologically visible.

Figs. 8 and 9 are sections from the organs of rats on the single deficiency diets. We exhibit them with the statement that when compared with sections from normal animals (Figs. 10 and 11) they show no anatomical changes which have been demonstrable under the methods so far employed.

Figs. 12 and 13 are sections of ovaries of rats on the double deficiency diet with their more extreme infertility. These ovaries do show several peculiar conditions which must be studied further, notably ova contained in unruptured graafian follicles which are composed of four cells. This section is to be compared with a normal ovum under high power (Fig. 14). These may be ova which have undergone premature segmentation, they may represent the development of four ova in a single follicle, we are uncertain what they represent and can at present make no statement about them except that they are plainly abnormal.

CONCLUSIONS

We conclude provisionally: 1. That a moderate decrease in the percentage of the fat soluble vitamine, of the protein, or of the calcium contained in an otherwise excellent diet produces a definite decrease in the fertility of individual rats.

2. That a slight decrease in the fertility of both partners will produce a sterile mating.

3. That the fertility of the mating may be stated as the product of the fertility of the individuals concerned.

4. That if the index so obtained falls below a given point the mating will be sterile, and that this result holds true whether the partners are of equal or of widely different fertility.

5. That these principles explain the fact that two individuals which are sterile when mated together may nevertheless reproduce freely when mated to new partners (of higher fertility).

6. That dietary deficiencies produce a lowered fertility which varies

Digitized by Google

in degree with different individuals though of the same parentage and in the same cage.

7. That diminished fertility sometimes results in the appearance of abortion.

8. That mere percentage deficiency in both proteins and calcium produces visible ill health and great infertility.

REFERENCES

(1) *McCollum, E. V.*: The Newer Knowledge of Nutrition, N. Y., MacMillan Co., 1918. (2) *Osborne and Mendel*: Jour Biol. Chem., 1918, xxxv; 1920, xli; Science, 1917, xlv, 294; Jour. Biol. Chem., 1915, xxiii, 439; 1915, xx, 351. (3) *King, Helen D.*: Jour. Exper. Zool., 1918, xxvi, 335; 1919, xxvii, 1; 1919, xxvii, 29. (4) *Hart, E. B.*, and *Steenbock, H.*: Jour. Biol. Chem., 1919, xxxix, 209. *Steenbock* and *Humphrey*: Research Bul. 49, Wisconsin Experiment Station. (5) *Robinson, Arthur*: Edinburg Med. Jour., 1921, xxvi, 137.

DISCUSSION

DR. EDWARD REYNOLDS, BOSTON.—We perhaps ought to say in self-defense that the numbers of matings which we have made are much larger than we have put on paper.

I would like to speak of one point which there was not sufficient time to bring out in the paper. Abortion with macerated fetus is apparently unknown in rats. We could find no mention of it in the extensive literature of rat laboratories, and Dr. Castle has never seen an instance. We had 8 cases of abortion with macerated fetuses in our small number of matings on deficient diets. We have seen many instances in the human race of defective and scanty spermatozoa in man whose diet was analyzed and found to be defective. Most of them have improved and some of them have returned to normal with correction of the diet. We have seen one instance in a woman of whose history we have an abstract report. She was a well nourished young woman of the well fed class. She kept a chef and maintained an ample table. She had had five successive abortions. We could find no cause for them. It seemed absurd to analyze her diet, but an analysis showed that during the years in which she had had these five successive abortions she had selected from the abundance of her table a diet which contained practically no calcium. At this point she became pregnant a sixth time. She was at once put on medicinal doses of carbonate of calcium; her diet was altered to one that contained an abundance of calcium, and in a little while medicinal calcium was stopped. The diet was continued and she went to term and bore a fine child.

A single case proves nothing, but in connection with rat work and work on cattle and swine it is known that a deficiency in calcium causes abortion. This is suggestive and well worth considering.

I would like to say also, we have not had time to introduce war statistics, but we have received statistics of the present birth rate in the central countries, notably in Austria, which show in spite of an increase in the marriage rate since the war the birth rate has fallen off, in Austria from 18 to 12 per cent.

DR. W. BLAIR BELL, LIVERPOOL, ENGLAND (by invitation).—I would like to express my high appreciation of this very valuable and important scientific paper. Furthermore, I should like to express my approbation of the judicious caution with which the conclusions have been drawn. I think Dr. Reynolds and Dr. Macomber have put the least possible construction on the practical issues arising from their work.

Digitized by Google

I dare say, many of you know that for fifteen years I have been very much interested in the calcium metabolism. It is exactly fifteen years ago since I published my first paper on the subject, and in that paper I drew attention to the extreme importance of calcium metabolism in regard to the reproductive functions.

First of all, I would call attention to what probably every one knows, namely, that a hen will only lay eggs when it is well supplied with calcareous material. I therefore investigated hens in my laboratory and by devising a method for estimating the calcium in the blood, I was able accurately to say when the hens had laid eggs, and when they had not laid eggs, and I could predict their functional ability. Those experiments of course, led me to examine women, and I found in them changes in the blood which were indicative of the relationship of the calcium metabolism and reproductive functional activity. Menstruation was found to be almost entirely dependent upon the calcium metabolism; that is to say, I found suggestive changes in the calcium content of the blood of women before, during, and after menstruation. Moreover women who suffered with amenorrhea owing to calcium deficiency could be made to menstruate by the administration of calcium lactate in therapeutic doses.

I also found many years ago just as Dr. Reynolds has found, that calcium lactate will prevent habitual abortion.

With regard to the results obtained by Dr. Reynolds and Dr. Macomber with protein deficiency in the diet, it seems to me, that a low protein diet is not of the same importance in this connection as the calcium deficiency. Protein, of course, is very obviously necessary for every function of the human body, and it forms such a large part of the human body that one looks upon a low protein diet as producing a general insufficiency.

I think that these experiments which have been detailed by Dr. Reynolds and Dr. Macomber show that a low calcium content in the diet is the specific factor in causing sterility.

DR. EDWARD P. DAVIS, PHILADELPHIA, PENNSYLVANIA.—I can only revert to published analyses of the blood of pregnant women showing its calcium content, and that these analyses show amply that the various disabilities of reproduction in pregnancy are accompanied by enormous variations in calcium content. My own observation and studies have been along the line of toxemia in which these variations have been exceedingly common, and a study of fertility may throw important light on the vexed problem of toxemia.

DR. MACOMBER, (closing).—I think it might be of interest to enumerate a few of the foods that are rich in calcium. Milk is the chief supply in the human diet, and an ample amount of milk, if taken, will counteract any question of deficiency. Green vegetables also contain moderate amounts, but milk is the chief source.

As Dr. Bell has brought out, medicinal calcium is either calcium carbonate or calcium lactate, which is a very valuable thing to use clinically, and as Dr. Reynolds has said we have had some success with it.

As to low protein in the food, I think it is demonstrated by our experiments that low protein alone, as Dr. Bell remarked, is not as important as low calcium, but when combined with low calcium it increased the bad effect of the low calcium. That is something that is rather universally appreciated by animal breeders as a whole because they make their diet for breeding animals high in protein.

Digitized by Google

PNEUMOPERITONEUM AND ROENTGENOLOGY AS AIDS TO MORE ACCURATE OBSTETRIC AND GYNECOLOGIC DIAGNOSIS

By Reuben Peterson, M.D.
*Ann Arbor, Mich.**
(*From the Department of Obstetrics and Gynecology, University of Michigan.*)

IT IS the purpose of this communication to give the results of some ten months' use of roentgenography after the injection of the pelvic and abdominal cavities with gas. Beginning the work with doubt and misgivings as to freedom from danger and practicality from the diagnostic standpoint, it can be emphatically stated that at the present time doubts have been cleared away and that it is one of the most useful procedures ever introduced into the clinic. Like all roentgenographic procedures, it requires long and close study before the plates of the pelvic and abdominal organs can be correctly interpreted. It was an easier matter after some experimenting to secure good plates from a technical standpoint, than it was to interpret what the plates showed.

Hence it follows that the obstetrician and gynecologist in order to obtain the quickest and most accurate returns from his work with pneumoperitoneum, must associate himself with an expert roentgenologist. Moreover, the latter must be interested in this new field and be ready to devote the necessary time to the interpretation of plates the like of which he may never have seen before. In fact it must be team work from the outset. To the gynecologist with his surgical experience can be safely entrusted the extremely simple technic of gas inflation, either through the uterus or the abdominal wall. He can be instructed even in the methods of making the plates. It is asking too much, however, to expect the clinician at the outset to interpret what is depicted on the plates. His work and experience have not been along these lines, for he has had to employ the x-ray but seldom in his work.

Personally I am very fortunate in having associated with me in this pneumoperitoneal x-ray work my colleague, Doctor James G. Van Zwaluwenburg, without whose cooperation nothing could have been accomplished. Not only has he willingly spent many hours studying out the meaning of the various pelvic shadows, bringing into play his accurate and comprehensive knowledge of roentgenography, but his patience has been unfailing in guiding me along hitherto unknown paths.

*In the absence of the author this paper was read by Dr. M. D. Haag of Ann Arbor, Mich., by invitation.

Digitized by Google

When we began this work Doctor Van Zwaluwenburg and I agreed that elaborate, complicated, clinical technic must be avoided, if a method was to be developed available for the average diagnostician and clinic. Hence the gas inflation, practically from the beginning, has been made in the gynecologic examining room of the University Hospital.

Aside from the emptying of the lower bowel and bladder, the patient needs no special preparation for the gas inflation. In a few of our early cases when oxygen gas was employed, the patient was fortified by a hypodermic of morphine, but this is neither necessary nor expedi-

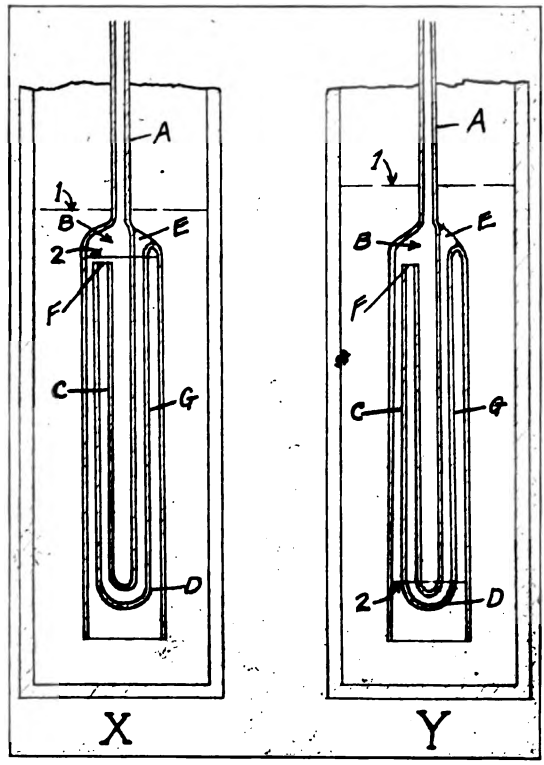


Fig. 1.—Syphon meter.

ent when the quickly absorbed carbon dioxide gas is used. Moreover, the use of morphine is inadvisable in the case of ambulatory patients who form quite a proportion of this material at the clinic, since out- as well as in-patients are inflated for diagnosis.

No expensive or elaborate table is necessary for gas inflation, merely one where a moderate tilting of the body downward can be secured. We have found this inclined position to be absolutely essential for the best results, since it is necessary for the pelvis to be freed from bowel coils if the pelvic structures are to be shown. This can be easily brought about by the use of the modified Trendelenburg posture with

Digitized by Google

the patient in the prone position. One such table will suffice, although in the clinic it has been found more convenient to make the injection, either through the uterus or abdomen, on the ordinary examining table, transferring the patient to the other table for the x-ray of the pelvis.

At first we used the method of Stein and Stewart, employing a bag between the tank and the point of injection, forcing the gas through the needle by pressure on the bag. This method was abandoned in favor of Rubin's apparatus by means of which the gas can be passed under a pressure which is easily gauged, while the amount injected can be accurately measured.

The apparatus for measuring the gas is an inverted syphon pulsating

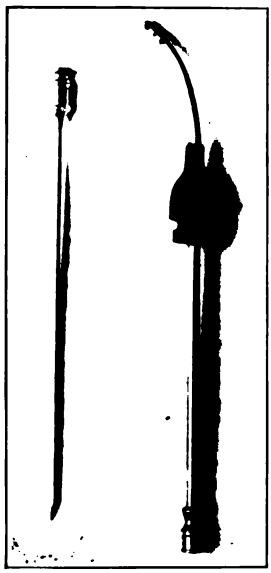


Fig. 2.

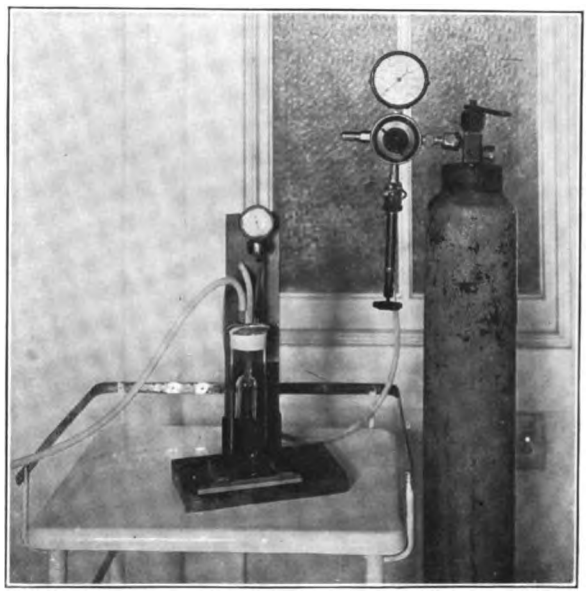


Fig. 3.

Fig. 2.—Needle and uterine cannula.
Fig. 3.—Carbon dioxide tank, gas pressure valve, syphon meter and manometer.

meter used by the engineers for the measurement of chlorine gas. It is composed of an inverted glass syphon inside a cylindrical glass meter (Fig. 1). The operation of the meter is as follows: "When the downward flowing gas in *A*, reaches the point *D*, it will rush up through the tube *G* of the syphon and the bell or compartment *B* will refill with water up to the upper end of *C*. This completes one pulsation or measure of the meter and the amount of gas delivered by this one pulsation is, of course, the capacity of the compartment *B* between the points *F* and *D*." (Wallace and Tiernan Co.) With this apparatus connected with the gas tank it is only necessary to keep track of

Digitized by Google

the number of pulsations to determine the amount of gas which is flowing through the cannula or needle provided there be no leakage. Any resistance to the gas flow can be readily determined by connecting the cylindrical glass-meter with a manometer. (Fig. 3.) For example, the manometer does not register when the gas is passing through the rubber tube connected with the needle with which the inflation is to be made through the abdominal wall. If, however, the tube be compressed at any point, the manometer index will rapidly rise according to the degree of compression of the tube and fall when the pressure on the tube is released. The same thing occurs when the flow of gas is impeded after the passage of the cannula into the uterus or the needle through the abdominal wall.

It is evident that before passing the gas into the abdomen or pelvis, it is necessary to regulate the amount of gas issuing from the tank under great pressure. We have had great difficulty in regulating the flow with the ordinary levers or wheels with which the tanks are provided. It really required more knowledge and experience to move the lever of the tank to secure the requisite gas flow than to use the cannula or needle. This difficulty has been done away with and the whole inflation made simple, easy and accurate by the use of a gas pressure reducing valve by means of which the flow of gas from the tank can be easily regulated. (Fig. 3.)

The uterine cannula is of metal of the Keyes-Ultzmann type perforated at the tip and provided with a rubber obturator for closure of the external os after the passage of the cannula so as to prevent the escape of the gas backward into the vagina. (Fig. 2.) The ordinary spinal puncture needle is well adapted for the perforation of the abdominal wall and the inflation of the abdominal cavity. (Fig. 2.)

The instruments necessary for the gas inflation are scrupulously sterilized before use. The abdominal wall or in case the transuterine route be employed, the cervix, especially in the region of the external os, is prepared by the free use of iodine. Rubber gloves, sterile towels, etc., are employed just as in any surgical procedure. Unless these precautions be taken, it is easily conceivable that infection may follow gas inflation and not be due to any irritation set up by the gas itself. In order to settle the question whether oxygen or carbon dioxide gas as furnished in the ordinary tanks, contained bacteria, as has been claimed, numerous bacteriologic tests were made of these gases as they emerged from needle or cannula. In every instance the cultures showed no growths. It has been asserted that the low temperature of the gas as it issues under pressure from the tank gives rise to peritoneal irritation. This does not hold true for gas passing through the rubber tubes, because the temperature of this gas as it issues from the needle or cannula was always found to be that of the examining room.

Digitized by Google

Obviously one must use common sense in the selection of patients to be subjected to gas inflation. Up to the present time no patient with acute inflammatory pelvic disease has been inflated by either route. When the history of recent inflammatory disease is doubtful, even should the patient have a normal temperature, no chances are taken, but the inflation is conducted by the transperitoneal route. While neither shock nor depression have followed the gas inflation, it has been refrained from in certain individuals with impairment of the circulation. In other words the watchword of the clinic in this work has been to take no chances but to always be on the side of safety.

In none of the 300 cases of gas inflation has there been any sign of peritoneal irritation. Thus we think we are justified in the conclusion that with the proper selection of cases and with the proper technic there is no danger attached to gas inflation.

The transuterine is the method of choice since it throws much light upon the patency or nonpatency of the fallopian tubes. The gas can be introduced with as little discomfort to the patient by this as by the transperitoneal route. Where the tubes are found impermeable, the gas is introduced through the abdominal puncture. If the gas be passing freely through the tubes into the pelvic cavity, it is our custom to allow enough to flow so that a satisfactory x-ray of the pelvis can be obtained. In other words, the procedure of Rubin for determining the permeability of the tubes with small quantities of gas, has been carried a step further in case the tubes be patent. This has been done deliberately because of the impossibility with present methods of determining whether the gas be passing through one or both tubal openings. In case one tube be diseased and the other open, the condition of the pathologic tube will be shown by the pelvic x-ray.

The Sims has been found preferable to the lithotomy position where the gas is passed by the transuterine route. (Fig. 4.) The cervix is exposed after the introduction of the speculum and the anterior lip of the cervix seized by the tenaculum forceps after the cervix and adjacent portions of the vagina have been sterilized by iodine. Care is taken to remove all secretions from the cervical canal, a short distance from the external os. The general direction of the uterine canal is located by the sound and the uterine cannula passed, the rubber obturator being pressed within the canal until a snug fit is secured. Dependent upon the condition of the cervix, more or less outward pressure must be exerted upon the tenaculum, else the gas will escape backward into the vagina. It must not be forgotten to test the permeability of the cannula before its introduction. In case of blockage, the manometer index will quickly rise, showing that the instrument is

Digitized by Google

faulty. Failure to observe this simple precaution for both cannula and needle may lead to wrong deductions.

The apparatus should have been previously set by means of the gas pressure valve for about six or eight pulsations a minute. Since the average gasometer of this type measures about 25 cubic centimeters of gas to each pulsation, the apparatus set at this rate of flow will allow of the passage of 125 to 200 cubic centimeters per minute. This amount should be used as a standard, as it has been determined by experience that this is about the maximum quantity which should be passed through normal tubes in one minute.

If the tube or tubes be permeable after the gas has been allowed to flow through the cannula there will be a rather rapid rise of the man-

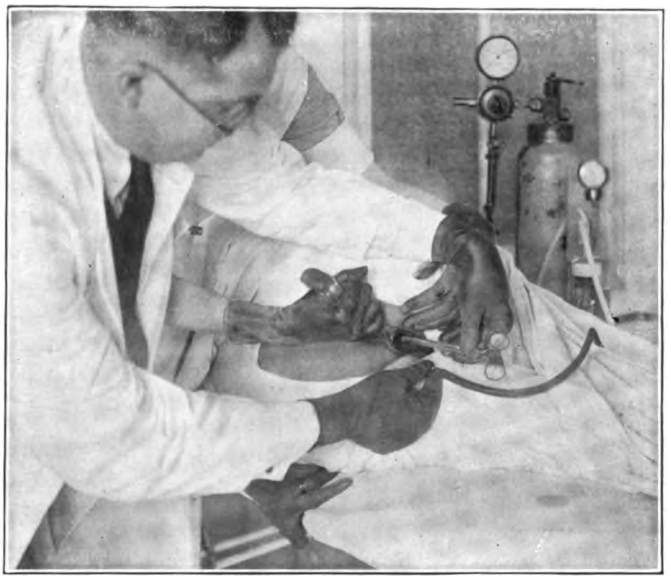


Fig. 4.—Method for transuterine gas inflation. Patient in Sims' position, perineum retracted, tenaculum forceps on anterior cervical lip, cannula in uterus.

ometer to about 100 or 110. Then as the gas continues to flow there will be quite a sharp drop from 30 to 50 points, at which place the manometer index remains quite steady. On the other hand, if there be any resistance to the flow of gas through the tubes, there will be a steady rise of the manometer and the flow of gas should be stopped at the 200 point. At first we believed that if the gas did not pass at 150 after two or three trials it could be concluded that the tubes were closed. However, further experience, especially with patients under anesthesia, has shown that patent tubes may require the 200 pressure repeated four or five times before the gas will pass. Whether this means that some obstruction exists in these cases at the isthmic portion of the tube has not been determined.

Digitized by Google

At first we used too large quantities of gas, some two or three liters, with corresponding pain and discomfort to the patient. Experience has shown that this quantity of gas is unnecessary, if the patient's pelvis be raised and the table tilted so that the gas can rise in the pelvis. (Fig. 5.) This is accomplished after the proper amount of gas has been introduced by holding the patient on the tilting table face downward in the knee-chest position until an inclined board can be placed beneath the thighs. This board makes an angle of about 28 degrees with the plane of the table. Its upper portion is cut out and rounded so that the pubes come to lie just above the deepest portion of the notch. A plate changing tunnel is then placed hori-

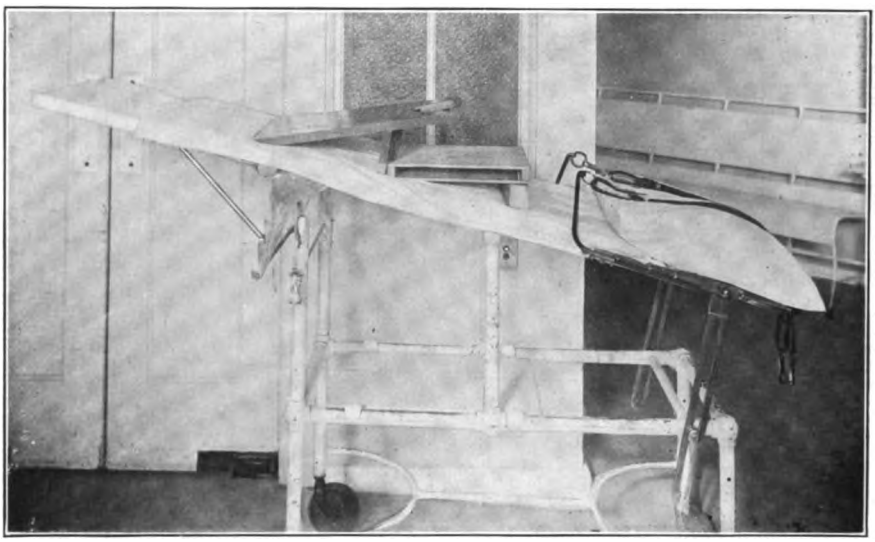


Fig. 5.—Table for taking pelykogram, showing notched inclined plane, tunneled plate holder and table at proper inclination (20°).

zontally on the table and the table tilted forward, the patient prevented from slipping by means of shoulder straps.

Experience has shown that to get the best results the table should be inclined at an angle of about 20 degrees. Excessive inclination of the table, when the pelvic organs are floated forward by the gas, causes too great displacement and makes the pelvic x-ray confusing.

A Coolidge portable unit operating on the ordinary lamp circuit furnishes the x-ray, the direction of the ray being in the long axis of the pelvis and perpendicular to the plate. (Fig. 6.) An 18-inch square of opaque fabric with a 6½ inch circular hole cut out of its center is laid on the patient's buttocks and serves as a diaphragm. Double screened films are used and the exposure varies from 14 to 20 seconds. The tube shift is in the long axis of the body and the stereo

Digitized by Google

set so produced is used as though the patient were lying on the right side.

The best results so far as the x-ray plates are concerned, taking into consideration the comfort of the patient, are obtained by the use of from 800 to 1000 cubic centimeters of gas. Larger quantities of gas quickly injected cause great discomfort and even pain to the patient. Hence it has been our constant aim to reduce the amount of gas injected to a minimum, our efforts being greatly aided by the use of the table arrangement just described. Since the patients complain of a sense of fullness in the lower abdomen and some discomfort when only 300 to 400 cubic centimeters of gas have been introduced and

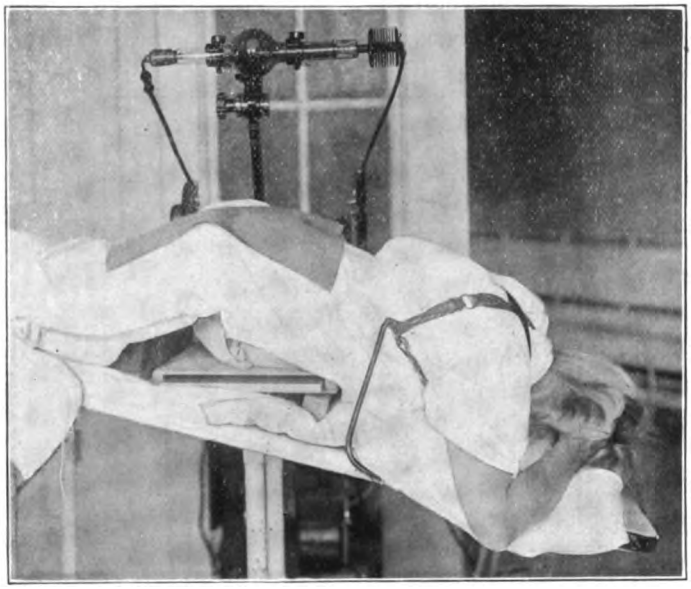


Fig. 6.—Patient after inflation in prone (partial knee-chest) position on inclined table. Opaque diaphragm, Coolidge portable unit arranged so that ray will fall perpendicular to pelvis and plate.

since that quantity has been found too small for proper inflation, it is obvious that a certain amount of discomfort will always be present. However, the sensation, excluding highly nervous women, may be described as discomfort and not the pain which always accompanies overinflation.

At first we used oxygen gas but abandoned it because it was slowly absorbed with corresponding persistence of the discomfort. Deflation relieved to some degree the symptoms but necessitated a second needle puncture, which for obvious reasons did not improve the technic. For these reasons we substituted for the oxygen, carbon dioxide gas which is absorbed so far as symptoms of discomfort are concerned in from twenty minutes to one-half hour. After inflation with this gas

Digitized by Google

patients return to the ward or leave the hospital without discomfort a half hour after the plates have been taken. In fact the one disadvantage of this gas is the necessity of having the technic of plate taking work perfectly smoothly. Delay beyond a certain point means so much carbon dioxide gas absorption as to materially lessen the chances of good roentgenograms.

In addition to acute pelvic disease, profuse purulent and bloody uterine discharges are considered contraindications to the passage of the gas by the transuterine route. In such cases the gas is passed through the abdominal wall by the following technic: The skin of the abdominal wall from the umbilicus nearly to the pubes and for a width of eight inches is sterilized with iodine. A fold of the abdominal wall just below the navel is compressed laterally with the left

Fig. 7.— Transperitoneal gas inflation. Needle in abdominal cavity and gas flowing.

hand and raised upward and made tense. A spinal puncture needle is passed through this fold in a slightly upward direction at a spot in the median line one and one-half inches below the umbilicus. (Fig. 7.) If the skin be made tense and the needle be sharp, no preliminary anesthesia of the skin will be necessary. The needle is passed downward until it meets the resistance of the fascia, the left hand still keeping tense the fold of the abdominal wall. The needle is then thrust through the fascia and peritoneum, a little experience giving accurate information to the hand when the peritoneum has been pierced. The stilet is then withdrawn from the needle and the latter connected with the rubber tube leading from the syphon meter. The latter is set by means of the pressure valve to about ten pulsations to the minute, so that it will require approximately four minutes at the rate of 25 cubic

Digitized by Google

centimeters of gas at each pulsation for 1000 cubic centimeters of gas to pass into the peritoneal cavity.

The objection that in case the needle does not pierce the peritoneum, the gas may be forced through the subcutaneous tissues is not valid, since by the manometer it can be told at once whether the gas is flowing freely into the cavity or is meeting with an obstruction. When the needle has penetrated the peritoneum the manometer index rises first some 15 or 20 points but falls usually immediately to almost zero. In

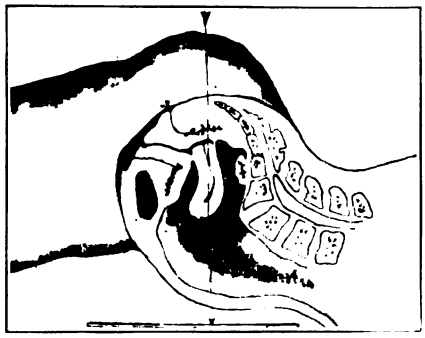


Fig. 8.—Correct inclination of patient, x-ray in axis of pelvis and perpendicular to plate. In this position with movable uterus the anterior and posterior culdesacs will be filled with gas. Plate will show cross sections of isthmus and fundus.

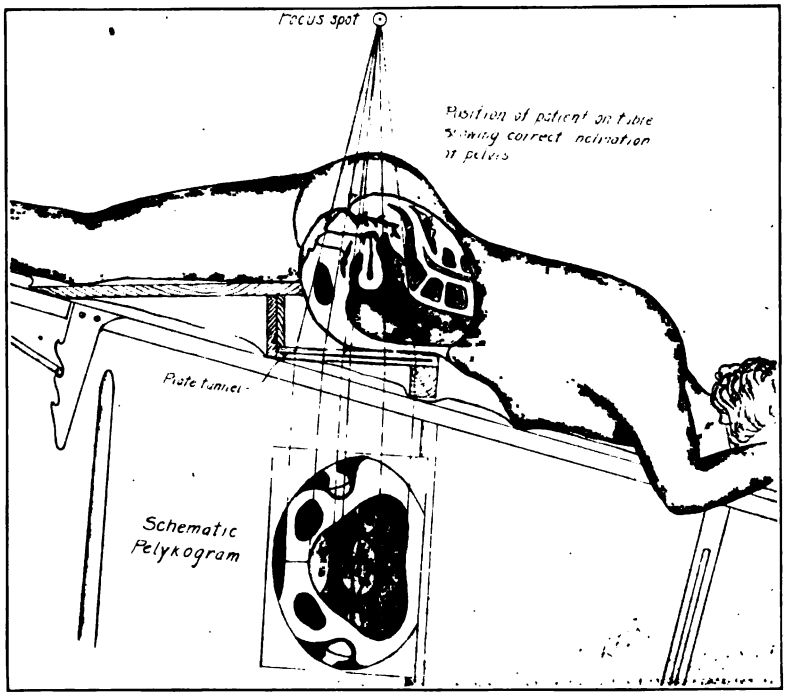


Fig. 9.—Correct inclination of pelvis with schematic pelykogram showing theoretical projection of pelvic organs. Partial knee-chest position secured by prone position of patient on frame and a 20° inclination of the table.

Digitized by Google

case this fall does not occur the patient should be directed to take a deep breath which will have the effect of lifting the point of the needle from anything which may be obstructing it.

At first the skin at the point of puncture was anesthetized by Schleich's solution but this has been discontinued since it was found that very nearly as much pain was produced by this procedure as by the passage of the needle. Obviously if the point of election for the puncture is over what may be an adherent intestine or if a neoplasm lies beneath this site, another portion of the abdominal wall must be chosen.

Before the patient is inflated in addition to a careful history of her case she is subjected to a most complete bimanual pelvic examination to which is added a rectovaginal examination if the case seems to call for it. Without going into details it will suffice to say that an attempt is made in every case to record on the examination sheet what the pelvis contains, not in general but in specific terms. For example, if in the case of inflammatory disease to the left of the uterus the ovary and the tube can be made out, it is so stated. If neither can be recognized by the examining finger it is so recorded. The same holds true regarding adhesions, relation of neoplasms to the uterus, etc. In other words such terms as sensitive mass, boggy mass, left-sided inflammatory have been discarded since our work has been checked up by the x-ray. We may and do make mistakes but at least they are definite errors from which valuable lessons can be learned.

The plates are taken to the x-ray laboratory and interpreted by Doctor Van Zwaluwenburg without reference to the clinical findings. Then the clinician and roentgenologist go over the plates set up in stereo in an endeavor to reconcile the two findings. If the case be operative, the patient is carefully examined under anesthesia and the actual findings, uninfluenced by the x-ray study of the plates, are recorded. If the abdomen be opened, the position and condition of the pelvic organs are dictated at the time and the final records of the case together with any removed organs are studied with the plates.

It certainly has been surprising to see how often it has been impossible to determine accurately by the examining finger the exact condition of the pelvic organs. I had failed to realize how much I was depending upon the opening of the abdomen to clear up fine points in diagnosis. From a study of the history together with a thorough pelvic examination it was decided whether the case was an operative one or not. The patients were always examined under anesthesia prior to operation but not so much to determine more accurately the exact pelvic pathology as to confirm the opinion that the case was one for operation. For always the easier method of making the exact

Digitized by Google

diagnosis was ahead of one since everything was to be cleared up after the incision had been made.

All this has been changed since the x-ray of the pelvis has been utilized as an aid to diagnosis. The clinician is placed upon his met-

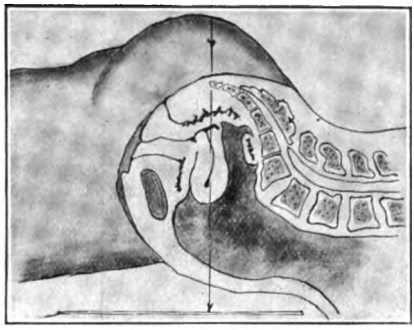


Fig 10.

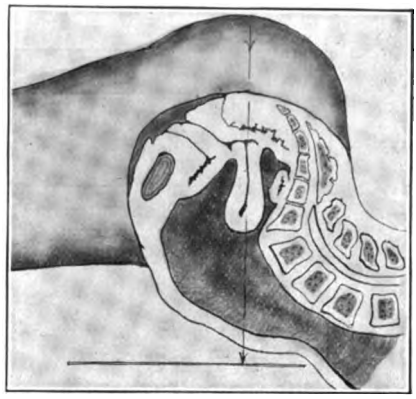


Fig. 11.

Fig. 10.—Insufficient inclination—no gas in vesicouterine pouch. Failure to differentiate anterior surface of uterus—may or may not project isthmus.

Fig. 11.—Excessive inclination. Restriction of posterior culdesac with failure to differentiate posterior surface of uterus and appendages.

tle, so to speak. He carefully weighs his opinion regarding the size and position of the uterus, the tubes and ovaries, if he is to go over his recorded findings and compare them with those of his colleague whose only knowledge of the case is what he sees depicted on the

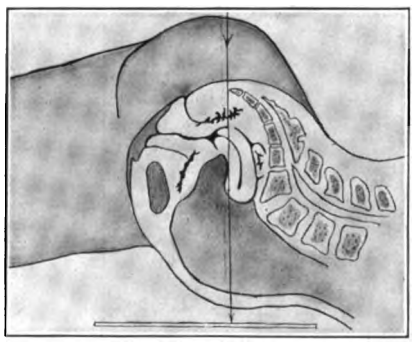


Fig. 12.

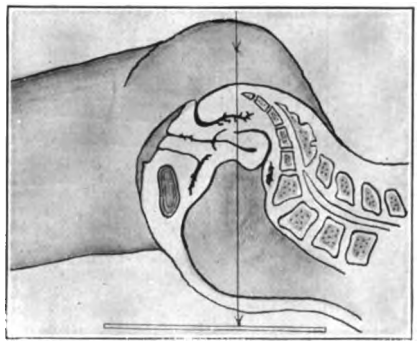


Fig. 13.

Fig. 12.—Retrocession. Obliteration of posterior culdesac and excessive width of the anterior culdesac. Simulates excessive inclination of pelvis.

Fig. 13.—Adherent retroversion. Complete failure to differentiate uterus. Often complicated by adherent bowel shadows.

roentgenograms. Renewed interest is aroused in being able to diagnosticate prior to operation what had been considered rather minor pelvic conditions, such as the exact position of the ovaries and tubes, or whether they be free or slightly adherent. At any rate it is a fact

Digitized by Google

that preoperative diagnosis, since the advent of the pelvic x-ray, has received a tremendous impetus in the clinic and has greatly improved.

In definitely stating what can be seen in technically good roentgenograms of the pelvis it must be borne in mind that this new field is constantly changing. What could not be seen at the beginning of

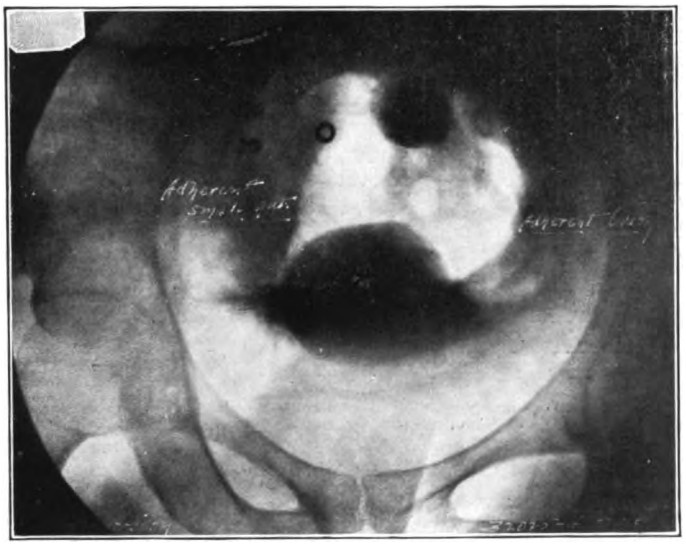


Fig. 14.—32025—Uterus slightly enlarged in the axis of the pelvis, appendages lost in the thickening on the inferior lateral wall of the pelvis and obviously adherent. An example of the spontaneous replacement of a non-adherent retroverted uterus.

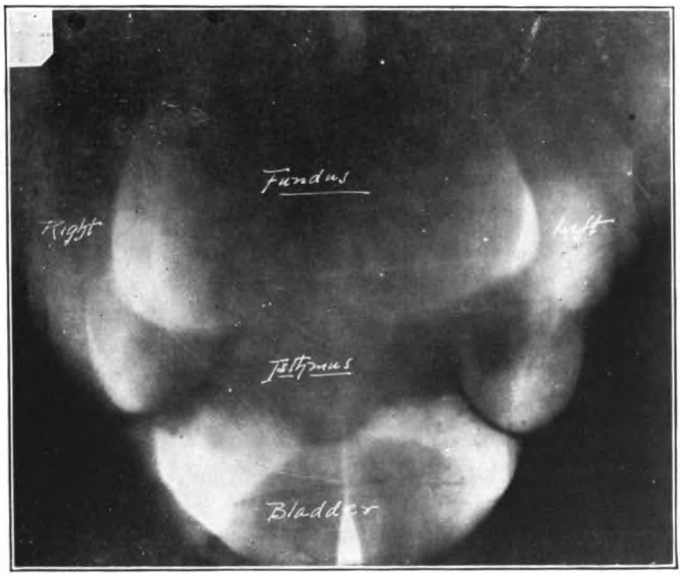


Fig. 15.—30426—Three months' pregnancy. The entire upper portion of the pelvis is filled with a rounded shadow representing the fundus of the uterus. Broad expansion of the isthmus, conspicuous round ligaments placed on the stretch, appendages hidden under the shadow of the fundus.

Digitized by Google

our work is perfectly apparent today and the same will probably apply to interpretations of plates months from now. However, enough can be made out at the present time to be of great aid in diagnosis.

The pelvic organs are represented on the plate by optical cross sections at the point of tangency of the projecting rays. (Figs. 8 to 20.) The uterus is nearly always clearly outlined and one can judge of its position, size and contour. If not drawn to one side by adhesions or displaced by a neoplasm, so that the ray as it is shot in the axis of the pelvis catches it fairly, the uterus will show two cross sections, one of the body and one of the isthmus or supracervical portion. It has

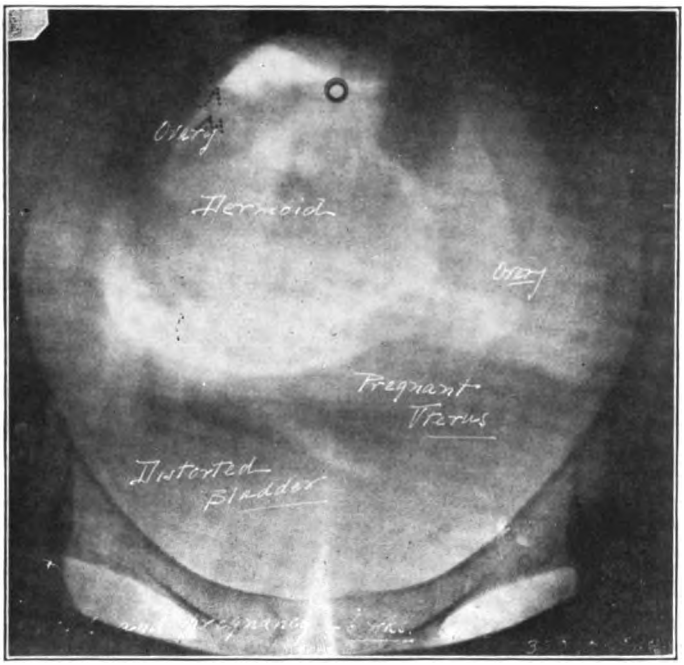


Fig. 16.—32024—Dermoid cysts complicated with six weeks' pregnancy. The uterus is slightly enlarged with conspicuous and enlarged isthmus displaced to the left by the large rounded shadow of the dermoid occupying the right posterior portion of the pelvis. The right ovary is displaced upwards and to the right. The left ovary is somewhat enlarged, the bladder partly distended and deformed by pressure.

been found that the isthmus is greatly enlarged and extends more into the broad ligaments in cases of pregnancy than in the nonpregnant. So striking is the change in the isthmus that by this sign alone it has been possible to diagnosticate pregnancy by the x-ray as early as the sixth week and before softening can be determined definitely by the examining finger. The sign is constant from two and one-half months onward, but we have not had sufficient material to date to be too dogmatic about the presence of this enlargement of the isthmus in every case of early pregnancy.

Digitized by Google

Irregularities of the uterus produced by fibroids and especially calcification changes in these growths are readily recognized on the x-ray plate. Through the changes in the isthmus described above it has been found possible to diagnosticate positively the occurrence of pregnancy in a fibroid uterus at a stage when it could not be considered probable from the history and clinical findings. In a number of cases where the patient has been exposed to pregnancy and where menstruation is irregular it has been possible to state definitely that the patient was not pregnant because of the size of the uterus and the absence of change in the isthmus.

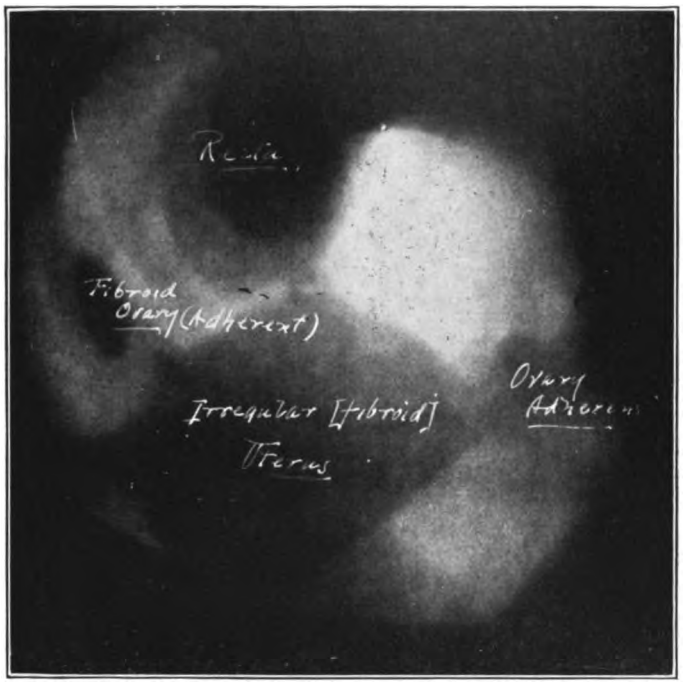


Fig. 17.—30159—Fibroma of the uterus and bilateral adherent ovaries. The irregularly enlarged uterus occupies the axis of the pelvis, both ovarian shadows are small, lying on the floor of the pelvis and at a lower level than the fundus. On the left there is some evidence of irregular adhesions. The position of the ovaries on the floor of the pelvis in the modified knee-chest position is indicative of their fixation by adhesions.

Since experience has determined just the right inclination of the patient in the prone position on the table to bring about the proper forward and downward displacement of the appendages, normal ovaries and tubes can be shown on the x-ray plates with great regularity. The size of the ovary can be quite accurately estimated and usually it is perfectly possible to differentiate between the free and the adherent organ.

It is not so easy to see normal tubes unless the gas has been passed by the transuterine route when from their distention they are quite

Digitized by Google

clearly made out. Enlarged nodular noncystic tubes are well depicted upon the plates and not infrequently are much better seen than palpated. Especially is this true when the tubes are adherent to the sides of the pelvis and covered with plastic exudate. In these cases

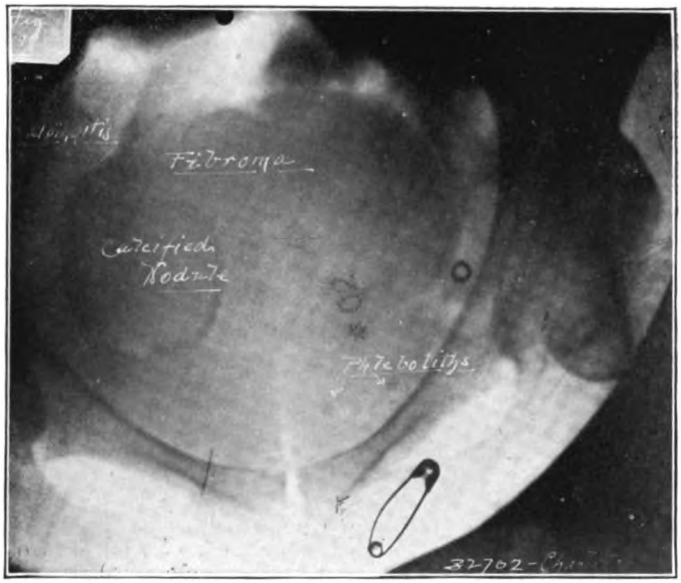


Fig. 18.—32702—Large fibroma occupying the upper portion of the pelvis and showing a nodular shadow representing calcification of a fibromatous nodule. An enlarged tube is seen presenting from behind the mass in the right posterior portion of the pelvis.

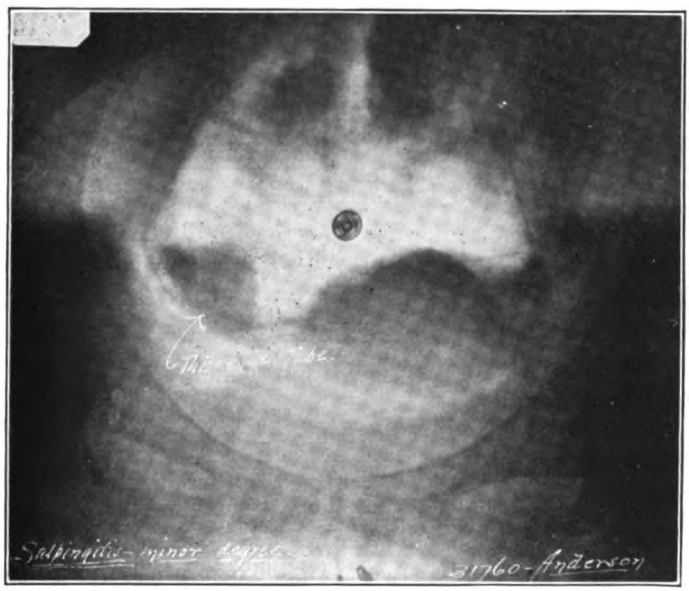


Fig. 19.—31760—Salpingitis, minor degree. Insufficient inclination of the patient, producing a narrow anterior culdesac. The right tube can be distinctly recognized as a thickened cord. Otherwise negative.

Digitized by Google

the clinician has long realized the difficulties of palpation and has depended upon the history, thickening in the region of the broad ligaments and decreased uterine movability as diagnostic signs of the condition.

Pus tubes with adhesions to the broad ligaments and bowel coils are particularly well seen on the x-ray plates. To be sure the clinician usually has little difficulty in palpating fairly distinct sacular distention of the tubes but when the pelvis is the seat of an extensive inflammatory process it is often quite impossible to differentiate the distended tubes. From experience the examiner judges what will be found when the abdomen or posterior culdesac is opened but his dif-

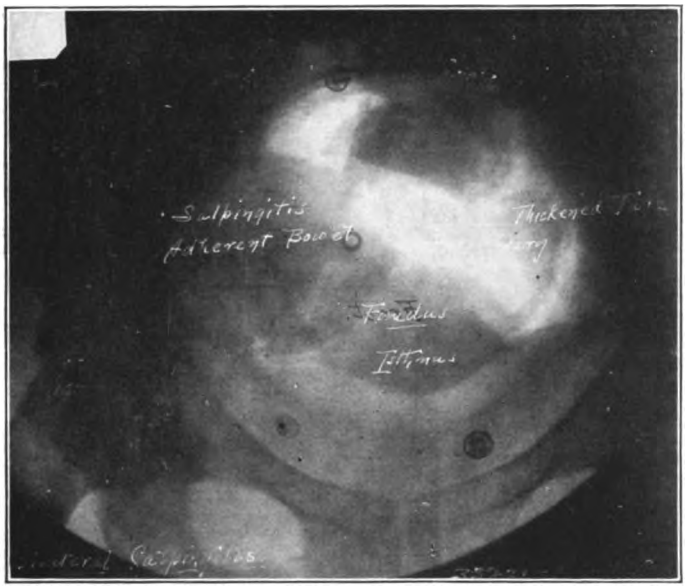


Fig. 20.—33221—Bilateral salpingitis. The fundus of the uterus is approximately in the normal position, flanked on either side by appendages of increased size and density, more marked on the right. The included gas shadows in the right side prove the presence of adherent bowel coils over the appendage.

ferentiation of the contents of the pelvis is not nearly as definite as can be brought out by the x-ray.

Pelvic neoplasms if not so tightly wedged in the pelvis as to prevent the gas from surrounding them are clearly shown by the roentgenograms. Since it is perfectly possible to show the outlines of the liver, spleen and kidneys by pneumoperitoneal x-ray plates of these organs, usually it can be determined by a study of roentgenograms of the pelvis and upper abdomen whether neoplasms arise from the pelvis or elsewhere and this means of diagnosis entails far less pain or discomfort than catheterization of the ureters or other diagnostic measures.

Digitized by Google

The above will suffice to show the possibilities of the pneumoperitoneal x-ray, since detailed clinical and roentgenographic findings will be dealt with in a subsequent paper. While pointing out what has been and can be accomplished by the new diagnostic procedure, it must not be thought that the idea is to belittle or do away with bimanual pelvic examination. In quite a proportion of cases information derived from this source proved far more accurate than that furnished by the x-ray. This was to be expected for bimanual examination has been practiced for years, while this kind of x-ray work is new and confined to only a few hundred observations. In fact nothing is to be gained, on the contrary much will be lost, by raising the issue of antagonism between the two diagnostic methods. Just as it is scarcely fair to demand that the roentgenologist interpret the pelvic x-ray plate without any knowledge of the case, so it is asking rather too much of the clinician in certain cases to state definitely the condition of the pelvic organs from bimanual examination alone. The rule of making separate diagnoses has been followed by us deliberately in order to gain the most knowledge from our different diagnostic methods. From now on it is planned to give due consideration to the other's findings in order that the most accurate diagnosis can be arrived at by the fullest cooperation.

It must be borne in mind that only about 300 patients have been subjected to the pneumoperitoneal x-ray. This means that the work, compared with tens of thousands of gastrointestinal x-rays, is just beginning. Greater study and experience will lead to such accuracy of diagnosis that it will be considered as faulty in doubtful cases to do pelvic work without a pneumoperitoneal x-ray, as to operate upon the stomach or upper abdomen without a roentgenogram.

Since it cannot be expected of the roentgenologist that he make clinical examinations, probably perfected diagnostic technic will come from the clinician who has made himself master of the pneumoperitoneal pelvic roentgenogram. With his knowledge of pelvic pathology which comes from his everyday work, he is better equipped than any one to interpret the pelvic plate provided he is willing to give up the necessary time and study to its interpretation. At least this is not too much to hope in the case of the young obstetrician and gynecologist just starting on his special work. For I am convinced that if we are to demonstrate that there is real need for our specialty, it must be through developing preoperative diagnosis. It should be the aim of the gynecologist by accurate diagnosis to state with ever greater and greater positiveness when an operation is indicated and when the symptoms can be made to disappear by other methods of treatment.

Digitized by Google

SUMMARY AND CONCLUSIONS

1. The pneumoperitoneal x-ray is a great aid to accurate obstetric and gynecologic diagnosis.

2. In suitable cases and with the proper technic, gas inflation is free from danger.

3. The apparatus for gas inflation and pelvic roentgenography is simple and inexpensive and can be used in any obstetric or gynecologic examining room.

4. The method should not be used in cases of acute pelvic inflammation or when disturbances of circulation may arise from sudden abdominal distention.

5. Since carbon dioxide gas is absorbed within half an hour, it is preferable to oxygen gas for inflation, since the latter gas may not be absorbed for days.

6. Whenever possible the transuterine should be chosen in preference to the transperitoneal route for the introduction of the gas because of the valuable information it furnishes regarding the permeability of the fallopian tubes.

7. Excessive quantities of gas cause great pain. Experience has shown that for the ordinary case 1000 cubic centimeters of gas will cause only moderate discomfort and are sufficient for good roentgenograms.

8. With the proper position (partial knee-chest with tilted table) and the ray directed perpendicularly to the plate in the axis of the pelvis the pelvic organs are clearly shown by roentgenography.

9. Experience with pneumoperitoneal pelvic roentgenography will enable the observer to diagnosticate with great accuracy the pathologic changes in the pelvic organs.

10. There is every indication that pregnancy can be diagnosticated as early as the sixth week by the pneumoperitoneal x-ray.

11. Bimanual pelvic examination and pelvic pneumoperitoneal roentgenography are not antagonistic diagnostic methods. Each is valuable and their value is enhanced if they be used in conjunction, each acting as a check upon the other.

DISCUSSION

DR. I. C. RUBIN, NEW YORK CITY.—(By invitation.)—I regret Dr. Peterson is not able to be here, because I wanted to learn from him a number of points that have been troubling me since I have done this work. So far, the total number of cases I examined by transuterine insufflation of oxygen and carbon dioxide is 326. In this series there were 192 that proved patent the first time. In 95 cases nonpatency was the result. In 25 cases the test was repeated once. In five cases the test was done three times. In one case it was done six times. In 8 cases the result was doubtful the first time and no later examination was carried out to corroborate the finding or to amplify it.

Digitized by Google

The cases that were chosen were those that were sterile either absolutely or those that had had one child or one pregnancy, that is a miscarriage. In most of these cases of miscarriage there was a history of intentional induction of abortion very shortly after marriage. These form a rather sad group of the sterile cases. In a great number of that group nonpatency was the result. I also used insufflation in a number of cases that had had operations for the relief of sterility or for other gynecologic conditions, but in which sterility was one of the features. For instance, there were a number of patients upon whom a Dudley or Pozzi operation or simple dilatation was performed. In others a stem pessary had been inserted. There were also a number of patients who had had ectopic pregnancy and upon whom a unilaterial salpingectomy was performed. One patient had had a bilateral salpingectomy for repeated ectopic. There was a small group of patients who had had disease of the adnexa and a laparotomy with ablation of both tubes, who were nevertheless still hopeful that they might become pregnant and who displayed an intense desire for future pregnancy.

The usefulness of this method was evident in cases where we had done therapeutic sterilization by ligating the tubes. There were a number of such cases in which it was important to learn whether the ligation was successful, or whether at least one of the tubes or the stumps had become patent. There was a small group of cases in which myomectomy was done as a conservative measure in preference to a hysterectomy because of absolute sterility, the hope still remaining that the patient might become pregnant. Where a number of tumors was removed from the uterus, particularly when one of these was of the submucous variety, it was rather interesting to determine whether in one or two places the sutured bed after enucleation might not have included the uterine ostium or the intramural portion of the tube. Then there was a small group of cases upon whom we had done plastic operations on the tubes, "conservative surgery" cases, which had had bilateral salpingostomy for bilateral hydrosalpinx or where the plastic operation was performed upon one tube in young women in whom we still wished to conserve the function of pregnancy. There were three cases in that group, and in one case only was patency proved. The other tubes proved nonpatent as it was impossible to get the gas through them to establish a subphrenic pneumoperitoneum.

I have not used the method for abdominal inflation except in a few instances. For the purpose of general abdominal diagnosis, I am using 1000 c.c., a little more or less. I do not believe that it is dangerous to do it for this purpose. I believe the peritoneum takes up gas rapidly when one uses carbon dioxide, and Dr. Peterson has amplified the method admirably and has come to the same conclusion. His patients have not suffered any untoward symptoms immediately, neither were there any sequelae.

My object primarily was to find a method whereby one could determine without operation, if possible, the fact of patency of the tubes, for I have had, as most of us have had, some disappointing experiences in cases that I had operated for sterility by one method or another, and in patients in whom the physical findings before the operation were absolutely negative. Undoubtedly many of these failures were due to nonpatent tubes that had escaped detection.

The points that have interested me particularly in developing the method in the last 150 cases, I am going to refer to briefly, and by the way, I have used carbon dioxide exclusively since it was first suggested. I use very small quantities of the gas, only 100 or 150 c.c., practically a cupful, which rises immediately after insufflation to the diaphragm, lifting it up slightly, as evidenced on fluoroscopic examination. The reaction of this subphrenic pneumoperitoneum varies with individuals. As a rule, the symptoms caused by the insufflation or the subphrenic pneumoperitoneum are very mild, and they result in a little sticking pain in either

Digitized by Google

shoulder or both. These pains are pathognomonic; they are so constant when we use 100 c.c. of carbon dioxide that without resorting to the fluoroscope we may say that the gas went through the tubes as evidenced by these pains. Patients, as we all know, react differently, however, to pain stimuli, and therefore occasionally one can slip up if he depends upon that symptom alone, because some patients are apt to say they have strained themselves on the examining table and have pains in their shoulders. Therefore, I have practically combined the use of the fluoroscope with the insufflation in every case. It is a simple matter.

I have done most of these cases in the office or in the dispensary, or in the x-ray department of the hospital, and most of the cases have been ambulatory.

One point I would like to emphasize in closing is this: if the method is to be of any permanent value it should be along these lines. In the apparatus I have employed, the gas is allowed to displace 40 c.c. of water through the siphon cylinder at the rate of 15 second's time, to raise the mercury column to 100 m.m. This I find is the most desirable rate of pressure flow. When the pressure reaches 80 before the initial drop, I have found so far that the tubes are normally patent. When the pressure of this rate of flow reaches 200 millimeters, the tubes are probably occluded, but at another time with a different pressure rate of flow, say 20 seconds to 100 mm. Hg. or 30 seconds to 100 mm. Hg., we may show the tubes are patent. In other words, the gas may go through at another time under different pressure conditions. When this pressure rises to 140 or 160 before a drop is noticed in the mercury column, there is probably stenosis in either one or both tubes. Occasionally in a nonpatent case, that is, where the pressure is high, we are ready to conclude that the patient has occluded tubes, but on second examination we will find the gas goes through. Therefore, I have adopted the rule not to say a patient is sterile on account of nonpatent tubes unless the findings are uniformly the same by three examinations. The important thing in the further development of the method is the behavior of the carbon dioxido insufflation in cases on which we are going to operate, where the abdomen has to be opened for one or another indication, and to note what happens under the eye by noting the pressure phenomena. After we have had a larger series of cases, we may be able by the present method to predict without doing laparotomy whether we are dealing (1) with normal patency of the tubes, (2) with a relative stenosis in one or both tubes, or (3) whether we are dealing with complete occlusion. The great contribution Dr. Peterson has made in the matter of tubal patency is where there has been a little increase in pressure he introduces enough of the gas so that he can get a picture of the pelvis and of the pelvic organs, and so can determine which tube is at fault.

DR. GEORGE GRAY WARD, JR., NEW YORK CITY.—I was stimulated to try out this very interesting procedure when Dr. Peterson came to New York and presented a paper before the Sloane Alumni Society. I sent one of my house officers to Dr. Rubin to obtain the necessary information as to the technic and the apparatus, which he kindly furnished us. We have tested the method with those cases that seemed suitable for it, and the results we have obtained so far in the Woman's Hospital are as follows:

GAS INSUFFLATION OF TUBES

Twenty-two (22) patients complaining of sterility have been examined. Carbon dioxide gas has been used in eighteen (18) cases and oxygen in four (4) cases. One (1) patient has been reexamined after an interval of one month. Only two (2) cases have been examined at operation following insufflation. No conclusions can be drawn from so few cases but the following observations have been made.

Digitized by Google

CLASSIFICATION OF CASES

The standards of pressure which Rubin has adopted to judge the condition of the tubes have been used to classify the cases examined. All cases examined in which the level of pressure has not risen to 150 m.m. with a rate of flow of the gas of 20-100 have been classified as patent. Cases in which the level of pressure has risen to or above 150 m.m. but has fallen before reaching 250 m.m. have been classified as partially occluded. A rise in pressure to 250 m.m. has been considered to indicate absolute occlusion of the tubes.

Using this classification the results have been as follows: patent, 14; partially occluded, 4; totally occluded, 4; total, 22.

CONFIRMATORY TESTS

Fluoroscopic Examination.—The determination of patency or occlusion of the tubes as indicated by pressure readings has been checked in all cases by an examination with the fluoroscope. Gas under the diaphragm has been easily observed in all cases believed to be patent or partially occluded, that is, whenever gas appeared to enter the abdomen as judged by pressure readings.

Right Shoulder Pain.—Right shoulder pain has proved to be a very common symptom. It has been present in fifteen (15) of the eighteen (18) cases in which gas has entered the abdominal cavity as soon as the patient has assumed the erect posture. This sign has been so common and so indicative of the presence of gas in the abdominal cavity that as Rubin pointed out fluoroscopic examination has been almost unnecessary when it has been present. This is of practical value from a clinical standpoint when a fluoroscopic examination cannot easily be obtained.

SUBJECTIVE SYMPTOMS

Insufflation has been accompanied by considerable discomfort for a short period of time in a number of the cases. Patients have complained of pain which is caused by the following: 1. Picking up the cervix with bullet forceps. 2. Passage of the cannula through a tight cervical canal. 3. Downward traction on the cervix. 4. Distention of the uterus when the tubes are occluded causing cramplike pains in the lower abdomen. 5. Reflex pain from the diaphragm in the right shoulder.

The right shoulder pain has been most severe, varying from slight discomfort to pain so severe that it was accompanied by nausea in five (5) cases and faintness in three (3) cases as soon as the patient sat up.

No alarming symptoms have occurred in any case.

It has apparently been very difficult for many of the patients to come to the hospital complaining of sterility when they had no other symptoms. Many of the patients are very apprehensive, and fear examination on account of the pain which it may cause. Many of the unpleasant symptoms can be avoided by going about the examination in a quiet way and reassuring the patient. After examination the patients have invariably soon forgotten all discomfort and have been very grateful to feel that an examination has been made which promises to give some definite information about their condition.

CARBON DIOXIDE VERSUS OXYGEN

Four (4) patients have been insufflated with oxygen. Two had occluded tubes and two were patent. One of the patent cases had no symptoms, the other was neurotic. She complained of pain and discomfort for three days following insufflation.

With carbon dioxide gas considerable discomfort has occurred in several of the cases. However, symptoms have never lasted longer than one-half hour. Carbon dioxide has been used for this reason and also because facilities were such that an immediate examination could be made with the fluoroscope.

Digitized by Google

VOLUME OF GAS

The volume of gas introduced has never exceeded 480 c.c. The average amount used has been from 240 to 280 c.c. The volume used has proved to have very little to do with the symptoms produced. Carbon dioxide is absorbed so rapidly that symptoms have readily disappeared, although a relatively large amount of gas has been used. This is important when an obese patient is to be insufflated since examination with the fluoroscope is difficult.

VALUE OF METHOD FOR PRODUCTION OF A PNEUMOPERITONEUM

Unless it is important at the time of examination to know also whether the tubes are patent, this method has not seemed practical for the production of a pneumoperitoneum. With the use of local anesthesia, gas has been introduced by needle through the abdominal wall with comparatively much less discomfort to the patient.

OBSERVATIONS IN INDIVIDUAL CASES

CASE 1.—The uterus was very small and sensitive to pain. Cramplike pains were so severe that the pressure could not be raised to 250 m.m. with either trial.

CASE 3.—This case was given a second trial after an interval of one month. The findings were the same at the second examination.

CASES 5, 7 and 18 give histories like that of ovarian hypofunction. The low level of pressure is interesting.

CASE 8. Here a high level of pressure was needed for penetration. The possibility of breaking down adhesions at the end of the tube would be an interesting interpretation of the findings.

CASE 10 is the record of a case which showed congenital occlusion of the tubes at operation.

CASE 11 is a case in which chronic bilateral salpingitis had been diagnosed in the clinic and in the house. Examination showed the tubes to be patent. Inspection at operation showed the tubes normal.

CASE 12 shows how a false interpretation could arise if the cannula was in a long tight cervix instead of the uterus during insufflation.

CASE 14 shows tubes patent. A preoperative diagnosis of left adnexal disease had been made. At operation the adnexae were found normal.

CASES 15 and 16 showed two occluded cases in each of which the bimanual examination was negative.

CASE 17 was a case in which a "right salpingectomy and a resection of the left tube and ovary" had been done three years previously. Gas passed into the abdomen.

CASE 21 showed a rather low level of pressure. A diagnosis of retroversion and adnexitis had been made in the clinic. Much involvement of the tubes seems doubtful.

In closing, I wish to say that I consider Dr. Rubin has made a very valuable contribution to our methods of diagnosis, and I cannot see how we can have any woman coming to us for sterility, where we have checked up the husband, without previously trying out this method to prove the tubes are patent before we subject her to various operative procedures either on the cervix or via the abdomen.

DR. EDWARD REYNOLDS, BOSTON, MASSACHUSETTS.—When gentlemen have done hard work and a great amount of it in developing a new method, it is always ungracious to present even in the most moderate way opposite views, and it is ungracious when one's personal experience is very limited as compared with the work the gentlemen have shown here.

My experience is limited to a demonstration of three cases by Dr. Rubin, and I

Digitized by Google

speak as a spectator of this method. I believe the method is demonstrated to be reasonably safe. I believe it is feasible, and that the evidence produced is probably in most cases valuable and reasonably dependable. However, I do not think it is a simple method. It demands special training and good training of assistants, and a good deal of training for the operator, so to speak. It involves a large amount of apparatus and care. Even after the training I cannot believe that it is an easy or simple matter for the patient. My impression was the patients suffered a great deal of pain, and that they were considerably prostrated afterward temporarily. I believe it to be a method of value and worthy of further exploitation. I feel it is not a method to which I should personally wish to subject a woman in whom I was interested unless I thought it would furnish evidence of distinct value to her interest. I think there is a very limited class of cases in which this evidence is necessary.

I protest against its use from my present knowledge as a routine procedure in cases of sterility. I think if a man has trained himself to accurate examination of the secretions of the genital tract in a woman he can obtain in most cases specimens which he has a fair right to believe are obtained from the body of the uterus and very near the fundus, specimens that are not contaminated, and also from the confirmatory evidence of the microscope that show there is no essential contamination. If you have spermatozoa at the fundus of the uterus in postcoital examination, and examine the secretion microscopically, you may feel sure that the tubes are not closed. I speak from a large experience in such examinations and no small experience in checking them by abdominal incision. A closed tube is always a tube with an amount of secretion in it. That secretion drains into the uterus and I believe it kills the spermatozoa almost always. If it has been diluted by much more abundant secretions of the uterus and cervix, you will find the spermatozoa within the cervix. If they penetrate to the fundus they are dead. It is usual, if not always, that they come in contact with concentrated tubal secretion which has killed them and you probably have closed tubes. If you have spermatozoa living at the fundus you may be sure the tubes are not closed.

I have recently seen a case in which the tubes were occluded near the cornu, with spermatozoa living at the fundus and tubes closed. With both methods we are liable to make mistakes. Both have their limitations of usefulness and I would not make a routine examination like that proposed.

DR. ROBERT L. DICKINSON, BROOKLYN, NEW YORK.— I would like to report 77 tests of patency of the tubes, 3 of them in Dr. Rubin's office.

In answer to the last speaker (Dr. Reynolds) the method has proved simple without a number of assistants. The first patient was a highly neurotic, badly frightened woman, pallid, and almost scared to death as she lay on the table. She had purple lips and some shock. In half an hour or three-quarters of an hour she was all right. She was a woman who suffered pain and was shocked. She was as bad a subject as you could find for intrauterine manipulation.

The other two suffered no more discomfort than you would find from introducing a uterine sound into a nonsensitive uterus. There was no pallor, no disturbance. In all three cases it was perfectly simple and easy to see the beautiful bow under the diaphragm through the fluoroscope under the gas as it moved. Objection has been raised that the Rubin test involved considerable apparatus and a number of assistants. That is not true. In using fluid for injection, not more than 10 minims enter, and if there is resistance you begin with eight minims, and in four or five minutes more the tubes are open. The maximum amount I have injected is 10 minims. The reaction is more than with gas. One-third of the patients have discomfort two or three hours later. I have had one marked reaction in a patient who had to go to bed, and one other who had considerable discomfort.

Digitized by Google

I do not believe a test like this, as Dr. Reynolds has said, is for the nonexpert. These tests must be worked out and tried and the cases must be very carefully selected. We have proved that this test can be carried out, and above all things we think there can be no longer any excuse for operating for sterility without resorting to the test to determine tubal patency.

DR. EDWARD H. RICHARDSON, BALTIMORE, MARYLAND.—I wish to say a few words in regard to this method. Through the courtesy of Dr. Rubin I saw this method demonstrated at the Mt. Sinai Hospital Dispensary, and my impressions were decidedly different from those of Dr. Reynolds. I talked with the patients after insufflation was completed, and I questioned them personally to find out whether they had much discomfort. They were standing up and would walk down to the fluoroscopic room and leave the hospital apparently with no more discomfort than a slight sensation in the shoulder. None of them showed any reaction, and I must say I think this is one of the most important contributions that has been made to the study of sterility within recent years.

I was much interested when Dr. Rubin's first paper came out, but I was skeptical about the safety of it. But we have had reported today from the Ann Arbor Clinic and from Dr. Rubin's clinic over 500 cases in which this method has been tried, and the testimony of these gentlemen is that there has been no serious result. I immediately obtained the apparatus and had it taken to Baltimore, and I tested it out on my first case just before I came to this meeting. It did not require any particular skill; it did not require a good deal of assistance, but it is simply a matter of carrying out the technic, and my experience in this one case leads me to believe that this method will come into general use in properly selected cases, and I think its safety has already been demonstrated.

DR. JOSEPH L. BAER, CHICAGO, ILLINOIS.—May I offer a word or two in defense of the simplicity of the method? I had the opportunity of talking with Dr. Rubin in Chicago last summer when the American Gynecological Society met there, and following that meeting I began using the procedure without having the benefit of seeing Dr. Rubin or others more expert than myself do the work. I am doing it entirely in dispensary surroundings and have only a nursing assistant. I have found it entirely feasible to carry out the test without any further aid.

The pain following the use of oxygen was easily controlled by a single dose of 5 grains of aspirin, and in no case has any shock resulted.

I should like to know if there is a distinct advantage in the use of the Sims position as against the dorsal position for the transuterine gas introduction. I have been using the dorsal position.

DR. HAAG, ANN ARBOR, MICHIGAN (closing).—With reference to what Dr. Rubin said about determining the patency of the tubes, we have made it a routine in cases where the rise of pressure has been very great, say up around 200 m.m. of mercury, to make at least four or five trials. We have found in our initial attempt to introduce gas into the tubes that it did not result in the gas passing through into the peritoneal cavity, but on the fourth attempt it passed through it at a relatively low pressure. In most cases we have used the transuterine or transperitoneal method and checked up the findings by operation.

I want to explain that some of the cases are labeled pyosalpinx, cystic ovary, and so forth, because they were diagnosed that way in the first diagnosis but checked up at operation and gone over carefully and labeled afterwards.

It is also interesting to know that the Department of Medicine and the Department of General Surgery of the University of Michigan were very much antagonistic to the method at first. Now, they are bringing their obscure cases over and asking us to inflate the patients, and we have been able to make some diagnoses for them.

Digitized by Google

We have one case of mesenteric cyst in which an absolute diagnosis was made by the transperitoneal method before operation.

One interesting thing we have noticed is the fact that obstruction a great many times occurs in the interstitial portion of the tube and not at the fimbriated extremity.

As regards the use of oxygen and carbon dioxide, if it is necessary to make an injection in the office and send the patient to a roentgenologist, oxygen is preferable because if there is any lapse of time between the injection and the fluoroscopic examination, you may miss your picture if you use carbon dioxide.

We are now making our own exposures, taking all exposures in stereo, so that we can become deft in examining the x-ray plates. One can get along very nicely without much assistance after he has once learned the method.

We have been using the method more or less routinely, not for the purpose of drawing definite conclusions but to get a large series of cases so that the members of the profession can tell whether they wish to adopt the procedure or not.

DR. RICHARDSON.—Is not this test carried out for the deliberate purpose of determining the patency of the tubes?

DR. HAAG.—We have only one case in which the abdomen was opened and we had the tubes directly in sight in which the fimbriated extremities were sealed. There was a small opening through one tube. I cannot tell the exact number of millimeters, but it is some where around 220. We would not get above 200 millimeters unless we could watch the tube. In that case the tube was forced open under 220 millimeters of mercury, but was under our direct sight where we could see what was going on. The fimbriated end was folded in and was sealed off.

As regards the question of Dr. Baer's, concerning the efficacy of the Sims or dorsal position, that is a personal matter. We tried the dorsal position first and tried the Sims position, and we found we could expose the cervix much more easily in the Sims position than in the dorsal position. That makes no particular difference as long as you get it done, but we like the Sims position better than the dorsal position.

We have not attempted to draw any conclusions. However, I do think from what we have seen in the clinic, there is one part of this procedure that will be used quite extensively, and that is the injection of gas through the uterus to determine the patency of the tubes.

Digitized by Google

THE UNSOLVED PROBLEMS IN GYNECOLOGY AND OBSTETRICS

By W. Blair Bell, M.D. (Lond.)
Liverpool, England

(By Invitation)

TODAY gynecology and obstetrics stand high among the developments of surgery along scientific and specialized lines; yet, the more I think of this, the greater is my wonderment that it should be so. It seems such a short while since our specialties were struggling towards the light.

When, therefore, I received your invitation to read a paper before this learned society it occurred to me that it might not be inappropriate if I were to consider for a few moments the principal avenue through which approach may be made to the secrets still hidden from us and the personnel and equipment required for the task.

I do not think there can be any doubt that the collective status of the gynecologists and obstetricians of the world in regard to clinical acumen and surgical technique is nearing the limit which must be set to human achievement, and that the same will soon obtain in regard to the bacteriological aspects of our special subjects. But in contradistinction to this must be placed the unsatisfactory character of our advancement, the slow progress we are making, in the more essentially biological, including biochemical, problems, connected not only with the normal morphology and physiology of the female genitalia, but also with the pathological developments that may be associated with the structure and function of the reproductive organs. Concerning the actual details of these problems I shall have but little to say, except by way of illustration.

First, let me consider how far our present methods of education are conducive to the correct mental attitude of the future investigator—whether they are methods that stimulate the powers of perception—and make every student an interested observer from the beginning.

It is a curious commentary on the value of the allied sciences to the surgeon of today, that there is a growing tendency—at any rate in my own country—to minimize the importance of biology and to urge the superior—I might almost say 'exclusive'—claims of the final hospital study; and this attitude is not confined to the student. This seems to me unfortunate, for it means that we are catering entirely for men of moderate intelligence and not at all for those on whom may fall the responsibility of sustaining progress in our science.

Digitized by Google

As a result of our existing methods, the clinical aspects of gynecology and obstetrics have been thoroughly illuminated, as I have said, while the more abstruse biological features are but very imperfectly understood and their claims hardly realized. It may be argued that there are many expert physiologists, biochemists and comparative anatomists, and this is true, but alone they cannot help us because they do not yet know our difficulties, neither have they the clinical nor technical knowledge with which to guide their steps. Up to the present the teaching of elementary gynecological anatomy and physiology has been conducted by the clinical instructor, because these subjects have been almost invariably ignored by the physiologist and anatomist. This means, generally speaking, that expert physiologists and anatomists have remained in more or less complete ignorance of these matters, and are, therefore, even now unaware of the hiatuses in our knowledge.

There can be no doubt, I think, that the man who continually has to face difficulties in practice is the one most likely to find the means of circumventing them, provided he have sufficient all-round knowledge and adequate facilities for his task. It is only natural, however, that each should turn his attention to those matters concerning which he is best informed. It is obvious, therefore, that if the many biological problems connected with gynecology and obstetrics, which so far have baffled us, are to be elucidated, we must modify the general plan of education in regard to those who may perchance attempt to throw light on what is now obscure and indistinct.

In attempting to indicate the direction in which improvement may be made, I shall doubtless merely give verbal form to what must already have taken shape in the minds of many.

In our educational methods, we are too apt, I think, to set store on detail. We should, I believe, aim at encouraging a comprehensive and inclusive outlook. We destroy originality by overloading the young mind with so-called facts which often are the easily deducible results of observation. Again, it seems to me that the different subjects of the general curriculum are taught in too disjointed and exclusive a manner. As gynecologists and obstetricians we should have the right—and the same applies to teachers in the other branches of final medical study—of defining the subject-matter of the physiological and anatomical courses. The anatomist should be required to demonstrate and to teach comparative and human anatomy on the lines we desire, and the physiologist should be obliged to lead, by experiment and demonstration in the laboratory, more directly to what will be taught later in regard to the human subject. There must, in fact, be more coördination throughout. It would be better, for instance, if the key-subject, biology, were taught in such a way as to make the student realize that in it Man is included in a wide generalization with the lower animals, and that Man is but the evolutionary physio-

Digitized by Google

logical and morphological climax. The student should be more definitely impressed with the knowledge that in his biological and biochemical studies he is watching the evolution of Man, that he is following the simple to the complex, and that what may be normal at one stage is pathologic in a higher state of evolution—that hermaphroditism, for example, is normal in the earthworm but abnormal in Man. If the student could be imbued with some conception of the ultimate value of all his biological work, and could be taught not to look upon it as a separate and isolated obstacle to arrest his onward course, not only would his hospital studies be more interesting and more relatively important, but also his mental attitude and outlook would be as much fitted for the investigation of biological as for the study of purely clinical problems.

The present trend, then, of medical education in Great Britain has been towards the production of good clinicians, rather than of men with their minds alive to the biological, morphological and physiological, including biochemical, import of the phenomena they observe.

I often wonder how far this question has been realized in America—this training of the student towards a wider scientific mentality. In Great Britain, where general practitioners are now being urged to coöperate in an investigation concerning the beginnings of disease, it is clear that there is a need of reform in our methods of education if we are to expect results on the lines I have indicated.

Supposing, however, that the student has been educated on these principles, in what circumstances and in what environment will he find inspiration and obtain the best results?

The establishment and success of clinical units and of units for group-study in North America and Canada may provide the answer. Their foundation is, of course, open to the interpretation that these systems have been brought into existence because the brain of the average intelligent man is incapable of grasping and understanding all the side-issues that go to make up the sum of medical knowledge; and I have heard it stated by an advocate of them that this is their *raison d'etre.* Moreover, it is said that only in them can material properly be utilized and the one-line worker find an immediate use for his output. While the last part of this statement is true, I cannot agree entirely with the first. A properly educated man of wide perception is not necessarily a man of encyclopedic knowledge, but, rather, one whose mind is so saturated with basic principles that the mosaic of detail falls into an orderly pattern under the influence of his prescient intelligence. A man with the index type of mind is rarely original, and is not, therefore, necessarily worthy of encouragement. I have already referred to this in regard to the education of the student.

Digitized by Google

Hunters and Pasteurs are, of course, born, not made, but I believe that useful imitations can be developed by proper education and training,—imitations good enough, in the helpful environment of which I have just spoken, to obtain results. Because the great biological and medical discoveries in the past have emanated from the brains of men ploughing a lonely furrow, there is no inherent reason why men of similar intellect should not again arise and in the more perfect environment that can be assured today unravel the outstanding questions. Meanwhile it should be possible now for men of lesser ability with proper education and in a helpful environment to surmount difficulties which the master-minds of the past, with their more limited opportunities, could not overcome.

I would once more urge the importance, so well recognized in this country, of clinical work going hand in hand with scientific laboratory investigations. You have many wise foundations for this purpose, whereas we are sadly handicapped for want of them.

In this continent there is offered to the well-educated man every opportunity for attacking these problems at a living wage; but in Great Britain we cannot always secure the best men for the service of science, for we are unable to offer them a reasonable financial reward, a reward in any way commensurate with that to be obtained from practice. This is a matter that is exercising us greatly, for times are changing, and while clinical matters are so well established that they can take care of themselves, there is urgent need that further progress, which, as I have stated, is largely biological, should not be crippled and hampered for want of proper organization in teaching and postgraduate research.

If, then, the last ramparts of gynecological and obstetrical diseases are to be captured we must modify to some extent our methods of education and we must bring correlation, breadth, and inspiration into the musty empiricism of the preliminary studies. I know the curriculum is overcrowded, but it is mostly with what could well be spared. We must, also, encourage scientific enterprise, and, after educating our students for their lifework, give them the opportunity of utilizing their talents and of advancing the science of obstetrics and gynecology.

I shall now endeavour briefly to substantiate my statement that the great outstanding problems in gynecology and obstetrics are biological in the narrowest sense of the word.

MORPHOLOGICAL PROBLEMS

The development of the human ovary can now be described with a considerable degree of certainty, but the same cannot be said in regard to that of the genital passages. To what factors, for instance, is

Digitized by Google

due the fusion of the Müllerian ducts in the genital cord? This is of considerable importance in connection with the common so-called malformations of the uterus and vagina. Professor Wood Jones, who has done so much excellent work on the comparative anatomy of the genital organs, believes that we should look upon these conditions of imperfect union as atavisms rather than malformations; and in this light the comparative anatomy of the genitalia becomes both interesting and instructive. Indeed, it is from this point of view alone that information can be obtained. If serial sections be cut of the divided and uniting uterine horns in various species of rodentia and carnivora, all the later stages in the development of the human uterus may be seen. Moreover, it will be made clear that the human uterus has morphologically but two muscular coats, not three, as usually described. Nevertheless, we do not yet know what determines the final development of the human uterus, and we can hardly expect to know until we have decided definitely what are the variations in the factors that lead to the different degrees of Müllerian union that are normal, constant phenomena in closely related animals. In rodentia there may be seen the complete didelphic condition with double vagina (viscacha) and the gradual evolution to the single vagina and bicornute uterus (aguti).

Again, can the peritoneal pouch that encloses the ovarian extremity of the tube and ovary itself, a structure seen in certain rodents, and, as I have found in a less complete form in hedgehogs, be passed over as a freak structure, in spite of the fact that, as Bland-Sutton has shown, it may exist as an atavism in woman? It seems to me that a structure so useful to fertilization and conception is worthy of serious study, especially from the point of view of the state of peritoneal currents and other influences in the creatures concerned. An investigation concerning the nature of the secretion of these sacs would also be of considerable interest.

Let me take another matter which, possibly, is of more clinical importance. How far are we familiar with the causes of the irregularities in the female bony pelvis, apart from those resulting from gross postnatal disease, such as rickets? We talk about civilization, athletics and the rest, but what causes a generally contracted pelvis in a well-developed non-rachitic woman who has been guilty of none of the enterprises that militate against functional perfection.

The work of Whitridge Williams and others has demonstrated beyond reasonable doubt that the typical funnel-shaped pelvis is associated with high assimilation, but I do not think the cause of high assimilation is definitely known. Such an important matter, especially in this country, is deserving of extensive systematic investigation. Comparative racial studies, in which different races were examined in their natural environments, might throw considerable light on this and on other pelvic ab-

Digitized by Google

normalities, for there can be no doubt that civilization may greatly affect structure as well as function.

As a last morphological point of interest, albeit there are many others, let me say that I look forward to the day when some gynecologist or obstetrician will give us the clue to the mode of origin of pathological neoplasms. After all, the gynecologist and obstetrician has, time and again, given a lead to the rest of the profession, and in the problem to which I refer he is on his own ground, for his work is chiefly concerned with the preservation of the structures and functions through the medium of which neoplastic developments normally occur.

PHYSIOLOGICAL PROBLEMS

It is within the last twenty years that practically all the recognized facts concerning the female functions have been discovered. We now know, if I may quote one of my own aphorisms, that a woman is a woman on account of all her internal secretions, and not only because she possesses ovaries. But we still lack certain evidence as to the nature of the controlling force that determines the primary sex-characteristics of the person concerned; nor do we know how it comes about that even in the course of development a conjunction of sex-characteristics may occur—a condition of hermaphroditism. Even if it be that the masculinity or femininity balance of the internal secretions is disturbed, this is still an effect, not a cause. That this fascinating and intricate problem is capable of solution I am convinced. It may well be the life-work of some one capable of estimating the gradual changes through the numerous classes of creatures that indicate the evolutionary origin of Man, of some comparative morphologist with all the histological technique of the present at his disposal on which to graft new methods of observation; and then, when the gross serial steps have been demonstrated, he may perchance gain an inkling of that on which they depend—an inkling of the forces which imbue the fertilized ovum of Man with maleness and femaleness.

There are few, surely, who cannot recognize today the vast importance of femaleness as opposed to maleness, and few, too, who are not conversant with the essential physiological, that is to say, biochemical, differences that influence the mind and body.

We have, too, some knowledge of what constitutes puberty. It is, we believe, the time of life when the metabolism has met the claims of somatic growth. The potentiality of a girl's metabolic resources, especially in regard to the calcium salts, at this time is such that it can support the strain of reproduction and all that this involves. But we do not know what happens at puberty to start the new train of events. What is the hormone that makes the ovary aware of the situation; is it then that the genital functions of the ductless glands come into being, and, if so, what leads to this awakening? That it is not a habit of life

Digitized by Google

is too obvious to need discussion: it is due, rather, to a series of chemical events closely connected, as I believe with the calcium metabolism that may be altered and delayed by many circumstances of nutrition and environment.

Then again, have we established without the possibility of fallacy the nature of menstruation? My view that it is an excretory process in regard to the principal elements required during pregnancy for the building up of the fetus, and during lactation for the formation of milk, as is made evident by the calcium metabolism, requires full confirmation and elaboration in regard to the exact part played by the ovaries and other internal secretions.

To pass on, I would ask whether there is general agreement concerning the factors involved in the production of the climacteric? I myself, for instance, disagree with those who think that the normal menopause is the result of primary ovarian atrophy, although many of the phenomena of the menopause are due to this change. The fact that the artificial menopause is produced by oöphorectomy has been a blind to all of us. If the ovaries are removed from a young woman with protracted amenorrhea and ovarian insufficiency, menopausal symptoms do not supervene. The artificial menopause is induced only when there has been preexisting ovarian activity. At the commencement of the normal menopause the ovaries are normal and active; indeed, at the end of that phenomenon the woman may be capable of conception. Why it is that ovarian substance or extract of any kind, and in any combination whatever and however administered, does not produce specific results at the physiological menopause, whereas whole gland ovarian substance, especially in association with thyroid substance, gives relief in cases in which the menopause has been induced by operative procedures? There are some, I know, who will dispute this; but I believe the facts, as I have stated them, to be true. From this jumble—shall I say?—of observations, it appears justifiable to ask you to consider as a working hypothesis for further investigations the view that there is at the climacteric some substance circulating in the blood, some natural biochemical toxin, or something withdrawn from it, which leads not only to ovarian atrophy but also to the other physiological and structural alterations that take place at the 'change of life.'

Another group of important correlated functions about which we know but little is that concerned with fertilization and conception. I think that light will soon be shed on that curious anomaly I call 'selective sterility.' In view of recent additions to our knowledge in regard to the incompatibility of the blood of persons in different groups, it is not unlikely that selective sterility, as well as successful homoplastic, as opposed to autoplastic, ovarian grafting, will be found to depend on a similar phenomenon. I have observed, however, that a

Digitized by Google

difference in the blood-grouping of married couples has no direct relation to the possibility, or otherwise, of conception.

Again, the normal interrelations that exist between the mother and the fetus *in utero* have been studied to some purpose; but we are still ignorant of the way in which the growing embryo controls the development of the chorionic epithelium that sometimes takes on such disastrous activity when the control is removed.

I do not think the theory that in such circumstances there is lutein over-growth is sufficient, for it is common to see vesicular mole and chorionepithelioma without abnormal lutein development.

Moreover, how little we know concerning the toxemias of pregnancy! Before we can arrive at any proper idea of the disturbance produced, we must know far more intimately the normal metabolic mechanism concerned and the maternal forces that are marshalled against the deleterious effects produced by what is, after all, a new growth in the uterus. If the recent work of Dold and Obata concerning eclampsia be correct, as seems possible, we shall be placed in possession of very interesting information concerning a biological phenomenon of vast importance, for I do not doubt that, if it be fully confirmed, we shall be able to test the blood of every pregnant woman before so serious a condition as eclampsia supervenes and to treat her with normal human serum. I have myself seen excellent results with blood-transfusion.

Although hundreds of thousands of human beings are expelled from the uterus daily, we have but a faint glimmering of the biochemical factors leading to the termination of parturition. Is it a gradual or sudden increase in the infundibulin content of the blood? And what of lactation? Is the mechanism of the simple nature I have described in the 'Sex Complex'? If so, we are little in advance of the ancients who, owing to their powers of perception, have always been worthy of consideration in matters of priority.

Such gynecological and obstetrical problems seem to me almost infinite when I let my mind wander around the outposts of our small impregnable position of certain knowledge. I have, however, today the desire to emphasize not only the importance of these unsolved problems, which we all admit, but also the essential biological nature of them. I have attempted, too, to show that our education tends to drive us forward almost entirely along the deeply trodden paths rather than along those barely to be seen or yet uncut through virgin country. I would plead, therefore, that our students and our postgraduates be more broadly educated at least in the great principles of biology, for I believe that only by way of physiological, especially biochemical, research, and by the comparative study of simpler forms of structure shall we be able to bring our art towards scientific perfection.

Digitized by Google

DISCUSSION

DR. WILLIAM E. STUDDIFORD, NEW YORK CITY.—I feel that Dr. Bell has brought before us some very large problems which we are as yet unprepared to solve. I quite agree with him that it is necessary to broaden the lines along which we teach our students; that their curriculum is already overloaded, and that there is necessity not only for increasing our clinical facilities, but of combining the clinical with the laboratory facilities. I believe that our teaching is largely developed along two distinct lines. The laboratory men have built up their own special branches, but there has been a tendency for the laboratory men to get away a little bit from the clinical side. It is the same way with the clinician. While clinicians have utilized the laboratory facilities, they have not always been in distinct harmony, and in the last two years, and especially since the war, there has been a tendency to break down the barriers that have existed between the laboratory and clinical side of medicine. There has also been a tendency to develop "group medicine."

Let us consider some of our obstetric problems. Take the question of eclampsia. It is not a simple problem for the obstetrician. It is a problem in which the internist, the laboratory man, the physiologist, the biochemist, are all interested, and unless we can get a group of men who are proficient in these various lines of working on the problem the solution seems as far distant as it has been in the past; but if we can combine these sources of information, our efforts may result in a solution. It is the same way with regard to many other gynecologic problems. The question of the development of fibroids is not only one for the gynecologist but for the physiologist, the pathologist, and the histologist. All these men should be interested, and it will be necessary to get such a group on the obstetrical service and on the gynecologic service if we are to eventually solve certain problems.

I was very glad to hear Dr. Bell speak of the necessity of having departments of anatomy teach anatomy along special lines. That is an effort I have been making in the last few years, and it has been of great help to the students to get the anatomic department to take up the subject of pelvic anatomy from a gynecologic and obstetric point of view, and not simply teach it as in the old textbooks. The same applies to comparative anatomy, the study of the development of the ovum being combined with the department of biology, utilizing such lectures and such teaching with special reference to obstetrics at the time the student reaches that point.

During the past year the department of biology took our students and elaborated on the previous lectures that had been given in the first two years, and when the class started their obstetrics they elaborated their previous lectures from a distinctly obstetric point of view. In is only by combining our various departments and getting them interested in our problems that a solution seems possible.

DR. EDWARD A. SCHUMANN, PHILADELPHIA, PENNSYLVANIA.—To those of us who live in the atmosphere of the biologic concept of medical problems, Dr. Bell's paper comes as water upon parched soil.

In Philadelphia, under the wise direction of Dr. Charles P. Penrose, we have attempted in a feeble way to solve some of these problems. At the Zoological Gardens in our city, which happens to be one of the larger ones of the country, there is a museum of comparative anatomy, with a paid pathologist and the requisite technicians and assistants. This pathologist has added to the staff of the Zoological Gardens a so-called consulting staff. He has a consulting neurologist, a man who is engaged in the active practice of neurology, a consulting internist, a man in the active practice of internal medicine, a consulting gynecologist and obstetrician. Every animal in that garden which dies is subjected to a most careful postmortem examination, and it is the duty of the staff member along the line of the particular

Digitized by Google

specialty involved to examine and report upon the organs of the animal as they are removed. Furthermore, there are conferences held at the Pathological Society, and those of us who are interested in biology attend the autopsy work in the Garden. Each year an annual report is published which includes the discussions of the various specialists upon the comparative anatomy and pathology of the specific group or set of organs. We not only note differences between groups of animals, but we observe what might be called the generic characteristics of the various species of animals, and it is the duty of the members of that consulting staff to publish their results from time to time. This work has not yielded as yet very much in the way of results, but we hope for development in the future, and we hope to elicit the interest and influence of a larger body of the medical profession in spreading this system of education to the other zoological gardens of the country.

DR. EDWARD P. DAVIS, PHILADELPHIA, PENNSYLVANIA.—Our education at present, it seems to me, has outgrown the interest of operative teaching and is somewhat weak, as has been so ably indicated by Dr. Bell. The slogan of teaching clinically is largely responsible for this condition of affairs, and so far as obstetrics and gynecology are concerned, we certainly need to revert as well as we can to the broad principles enunciated by the essayist to whom we have listened. He has indicated some of the most important clinical problems of obstetrics, not only in our studies of the question of toxemia, the condition of the blood in pregnancy, but also in lactation. Lactation is neglected in the study of obstetrics and in the teaching of obstetrics to medical students, and there is abundant evidence that lactation is a complex process; that it is one of those blood crises incident to parturition which throws valuable light upon some other conditions, and that the wellbeing of the mother and oftentimes the wellbeing and life of the infant may depend upon an intelligent appreciation of this fact. For instance, we are familiar clinically with the fact that in some cases of unexplained fever after birth, that in some cases of abnormalities in lactation the administration of the extracts of the ductless glands will bring about a happy solution of the pathologic condition. So in preparing pregnant women for successful lactation it is quite likely that we may yet, and very soon, evolve indications from a comparative study of the blood and in some cases administer extracts of the ductless glands with great benefit.

I think the numerous suggestions made by the essayist are exceedingly valuable. One which comes to my mind is especially timely, namely, so far as the teaching of obstetrics is concerned, the question of not laying so much stress on mere technic and possibly the performance of operation, but by leading the student through biology, comparative anatomy, biochemistry, indicating to his mind that the parturient woman is a complex individual, and that the larger part of her physical prosperity and that of her offspring will depend upon a close study of physiologic phenomena. Moreover our scientific knowledge must be utilized to remedy any defects or difficulties which may arise in the physiologic and anatomic condition of the mother and the child.

DR. JOSEPH BRETTAUER, NEW YORK CITY.—I feel that very few of us can discuss Dr. Bell's paper as intelligently as we would like to. The suggestions he has thrown out are so clear and yet so difficult to be made use of, that I for one feel it requires a different basis than the one we have to carry out work along the lines laid down by Dr. Bell.

There are two distinct principles on which teachers of medical students ought to act. We must not lose sight of the fact that we have not only to teach students and the younger men to be helpful in practice, but we have to teach them how to treat a sick woman. A man of average intelligence can be taught how to treat a sick woman. The average student, however, cannot be taught to do the work which is required to follow this line of research. It takes a man with

Digitized by Google

more than the average intellect or average brain to carry out the work of this kind. Biochemistry is one of the most difficult subjects which the younger men can study and very few will become really efficient in it. If you look over the membership list of a chemical society or a society of physiologic chemists as they call themselves now, you will find among a membership of 150 to 175 scarcely half a dozen, possibly one or two more, who have done real original work in this line.

I happened to be present at the discussion of a subject which was far beyond me. In that discussion one of the real pathfinders complained that he could not find young men to carry out that sort of work; that it could only be done in institutions which are amply supplied with funds. Therefore, I do not think the ordinary clinic, which has not at its disposal a fully equipped laboratory, can undertake this work. When I say a fully equipped laboratory I do not mean simply a microscope, the various histologic appliances or even chemical appliances, but a biochemic laboratory, which means an enormous outlay. I think it is special work which will never be done in conjunction with any obstetric or gynecologic clinic. It must be done by men who do nothing else. Of course, it is entirely different with comparative anatomy. We are fortunate enough to have among us a man who has done a great deal in that line, and he has certainly taught his students more of special anatomy than the usual anatomist does.

To repeat, I am sorry to say that while it is most likely this subject will receive proper attention and direction in the future, yet at present, I think the average student will not be able to follow it.

DR. BELL, LIVERPOOL, ENGLAND (closing).—I am grateful to the gentlemen who have spoken for their kind words concerning my work and for expressing their views in the matter I have brought forward. It was with considerable difficulty that I made up my mind as to the subject I should discuss before this Society. Finally, I decided on a difficult problem that has been a matter of the greatest interest to me all my professional life. When I was a student little biology was taught, and in going about I find very little is being taught today. My research work has been chiefly along the lines of biology and embryology, mostly straightforward biology.

Today there is a tendency toward ultraspecialism, such as the specialization in regard to operations, yet we know that in considering gynecology and obstetrics we have to consider the whole woman. Gynecology extends far beyond the limits of the pelvis.

I was interested in the remarks of Dr. Schumann regarding the anatomic and pathologic work being performed at the Zoo in Philadelphia. Many of the interesting articles of Bland-Sutton were based on information gained while he was making pathologic investigations at the Zoo in London. There he did splendid biologic work when he was a young man.

There are many things of interest in regard to the anatomic conditions existing in animals, for instance, in the lemur. I have found that there is a natural state of exophthalmos and that the thyroid gland in this animal has the same appearance as that seen in the human subject suffering with exophthalmic goiter.

Digitized by Google

THE DEVELOPMENT OF THE HYMEN

By Fred J. Taussig, M.D.
St. Louis, Mo.

In 1908 in an article published in the *American Journal of Anatomy* I presented evidence based on the serial study of six embryos of 12-26 cm. body length that pointed to the origin of the hymen as a connective tissue proliferation directly back of the entrance of the vagina into the urogenital sinus. I stated at the time that I did not consider these six embryos sufficient to establish my views and that I hoped in the course of years to find some authoritative confirmation or refutation of my findings. Strange to relate, while a number of articles dealing with this subject have appeared during the past thirteen years, the evidence has as before been largely based on the study of congenital anomalies, of gross anatomic dissections and of single microscopic sections through the lower portion of the genital tract. Textbooks of embryology have in the main simply restated the time-worn theory of Nagel that the hymen was an obliteration membrane left at the point of entrance of the muellerian ducts into the urogenital sinus. The latest textbook by Prentiss-Arey (1920) again says: "The muellerian tubercle is compressed into a disk, lined internally by the vaginal epithelium, externally by the epithelium of the urogenital sinus or future vestibule. These layers with the mesenchyme between them constitute the hymen, which thus guards the opening into the vagina."

I have therefore felt impelled once more to take up the cudgels in defense of my theory and try if possible definitely to settle all points concerned. All students of embryology must acknowledge that in dealing with such a minute fold as the hymen during its early stages, serial microscopic sections can alone be relied on to give the necessary information. Access to an unusually large collection of well-preserved embryos from the fourth to the sixth month of fetal life in the Anatomical Department of Washington University gave me opportunity to supplement on a larger scale my original studies. Twenty embryos varying from 15.5 to 33.5 cm. head-breech measurement were examined and the lower urogenital tract studied in sagittal serial sections. In almost every point these investigations confirmed my former findings and their interpretation.

The Hymen in Animals.—According to Schmaltz, in pigs, horses, cattle and dogs there is a definite constriction at the junction of the vagina with the vestibule. At times this constriction has the appearance of a membrane, but the descriptions do not indicate any active

Digitized by Google

connective tissue proliferation at this point, no formation of vaginal rugae or intertwining folds such as appear in certain anthropoid apes and in the human race. A similar constriction is found at the anus, the urethra or almost at any point where one duct joins another or reaches the surface. It is, however, a very different thing from the typical fold we see in certain apes and in man. Such a fold is not present in lower animals. Particularly in the American apes (Cebus) and in certain anthropoid apes such as the chimpanzee and gorilla a distinct hymeneal fold has been regularly found. The resemblance of the hymen and the genital organs in the American ape and the human race suggests that secondary retrogressions within the primary family tree may have occurred and that in this respect man may retain a more primitive form than that found in some of the anthropoid apes.

Fig. 1.—Sagittal section, slightly lateral to midline, showing hymen (Hy) as a fold within the vagina (Va) and separate from the entrance into the urogenital sinus (U. S.).

In the embryo of 3 cm. body length the muellerian ducts reach the urogenital sinus and, after coalescing, project into the lumen of the sinus as an epithelial proliferation called the muellerian eminence. Six weeks later in the 10-12 cm. embryo there occurs a bulb-like enlargement of the coalesced ducts directly back of this eminence. This brings about a fold or membrane formation that Nagel interprets as the original hymen. Berry Hart on the basis of five embryos studied in serial section considers this bulb-like thickening as a product of the wolffian duct and hence concludes the hymen to be of wolffian origin. The careful investigations of Robert Meyer in 116 embryos studied serially definitely proves, at least to my mind, the falseness of Berry Hart's views. He found evidence of the wolffian duct as a separate,

Digitized by Google

narrow duct in a large proportion of his embryos reaching all the way down even to the edge of the hymen. The wolffian duct cannot, therefore, form the lower vagina as Berry Hart would have us believe.

The mistake that Nagel and so many of the men who have studied the subject since his time have made has been that they failed to study what becomes of this original connective tissue fold in the course of the following six weeks. In 1875 Dohrn, who paid special attention to this stage of embryonic development, found in a study of 25 embryos of 18-26 cm. body length on cross-section with the aid only of a magnifying glass that the true hymeneal fold occurred as an independent proliferation directly behind this original occluding membrane. Let us also remember the evidence of Schaeffer who made

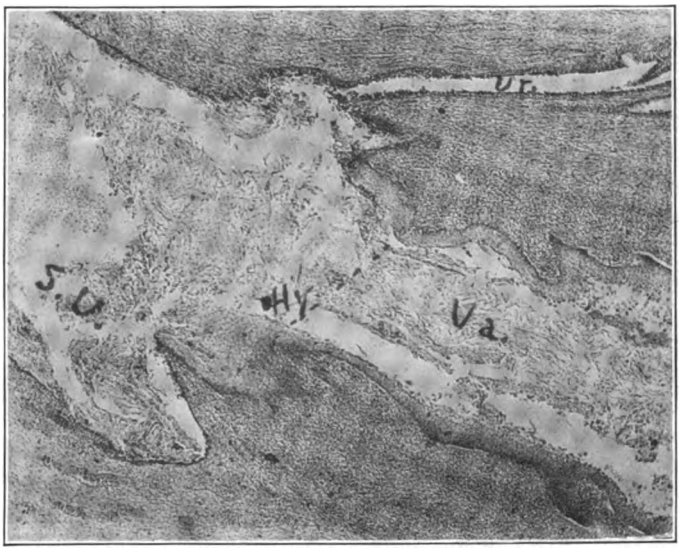


Fig. 2.—Sagittal mesial section embryo (16 cm. head-breech) showing edge of hymeneal ring inside the vagina. The muellerian eminential fold lies between it and the urogenital sinus (S. U.).

similar cross-section studies in 170 embryos and found in many instances a double fold which in my previous paper I interpreted as due to occasional persistence of the original muellerian eminence fold in addition to the true hymen.

What I mean by these two folds can best be seen by going on to a study of my own evidence. In the smallest embryo of my series (Fig. 1) one of 15.5 cm. head-breech measurement, you see the eminential fold similar to that described by Nagel, but above it lies another definite connective tissue fold or membrane that can be followed as such in my serial sections. This fold measures in its anteroposterior diameter one half millimeter. The next step is the dilation of what I have termed the "eminential fold" (the original hymen of Nagel) by an

Digitized by Google

outgrowth of epithelium and connective tissue from the vagina (Fig. 2). All embryologists have been astounded at the pronounced growth impulse that is localized at this point during this period. In the short space of six weeks the hymen increases over 20-fold in size, for in the embryo of 30 cm. body length it is 10 mm. in anteroposterior diameter and protrudes for a distance of 6 mm. out into the vestibulum. Measured along its circumference the hymen would be almost 15 mm. in greatest extent. Now let us watch step by step the manner in which this tremendous outgrowth occurs. Limited anteriorly and posteriorly by the urethra and rectum it is but natural that this growth energy should have sought the point of least resistance, namely outward through the original vaginal orifice between the labial folds and beyond. I wish to call especial attention to the following points:

Fig. 3.—Sagittal mesial section, embryo (20.5 cm. head-breech) showing outgrowth of vaginal tissue forming the hymen through the muellerian eminential fold. The edge of this fold can still be recognized by its covering of vulvar epithelium at the lower half of the hymen. The hymen proper is covered on both sides by vaginal epithelium.

(1) In the earlier stages there is still a definite ring of the original eminential fold left at the margins of the hymen.

(2) The outgrowth is an actively proliferating process sending papillae in all directions, not a passively formed membrane due to epithelial enlargement at the end of the vagina as Nagel and other embryologists have stated.

(3) The outgrowing hymeneal fold is lined on both sides by typical vaginal epithelium (Fig. 3). Only in that portion of the hymen that juts far out beyond the labia do we note a beginning change resembling vulvar epithelium. In the hymen of the newborn this change to an epithelium resembling vulvar epithelium has become more pronounced over the

Digitized by Google

entire outside of the hymen. It is because many have examined only the early stages of Nagel and the fully developed hymen of the newborn that the original theories concerning its origin have so long held their ground. (Figs. 4-7.)

Fig. 4.—External genitals of embryo, 15.5 cm. body length (same as Fig. 1). Labia majora separated, clitoris and labia minora visible but no external evidence of hymen.

Fig. 5.—External genitals of embryo 28 cm. body length, with prow-like projection of hymen (white) between labia.

Fig. 6.—External genitals of embryo 24 cm. body length with labia minora separated showing a typical septate hymen.

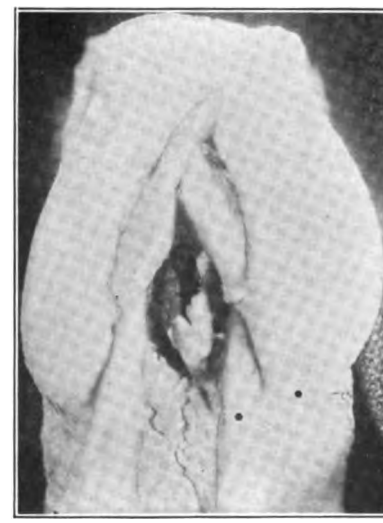


Fig. 7.—External genitals of embryo 23 cm. body length, showing typical fimbriate hymen.

So much for my embryological evidence. What I have said against the value of anomalies of development in solving the hymen problem applies only to their value in *establishing* a theory. In the last analysis

Digitized by Google

all studies of development must be based primarily on embryologic evidence but anomalies may well be used as evidence *in rebuttal* against any theory. Let us for a minute see how our theory will hold against such evidence *in rebuttal.* Pozzi, Küstner, Blair Bell and others have noted the following anomalies:

(1) Hymen present in complete atresia of vagina and uterus.
(2) Hymeneal fold around the urethra or vestibulum.
(3) Absence of hymen in presence of normal vagina and uterus.
(4) Single hymen with double vagina.

In the last mentioned instance an incomplete vaginal septum may explain the apparent singleness of the fold, particularly as we find double hymen with double vagina much oftener.

The other three anomalies, however, can hardly be explained if we accept the hymen as an essential part of the early developmental processes at the muellerian eminence. If, however, we accept my view that the hymen is a more or less independent mesodermal proliferation occurring at a later stage in the development of the vagina, then it would naturally follow that this mesodermal impulse might at times be misdirected and show itself as a urethral or vulvar fold outside its normal position behind the muellerian eminence. Such a fold formation would to a certain degree be independent of the development of the vaginal tract, so that even in complete atresia of the vagina, a fairly well defined hymen might be present and, on the other hand, in an arrest of development of the fold, we might have a normally formed genital tract with an absence of the hymen.

Even more interesting is the application of this view of the development of the hymen to the interpretation of so-called hymeneal atresia. It has long been a puzzle how one little portion of the genital tract could become atresic and the remainder be fully developed and functionating. I refer now to the cases with normal onset of menstruation and the formation of a hematocolpos behind the occluding membrane. Nagel, Veit and others who held fast to the formation of the hymeneal membrane out of the muellerian eminential fold were convinced that such a localized vaginal atresia was embryologically unthinkable and sought to explain this phenomenon by some change in postfetal life. Infectious processes in the vagina of the newborn, more especially gonorrheal vaginitis, was thought to be the agent in formation of this obliterating membrane. This has seemed far-fetched to many. Why we should have agglutination of vaginal folds only at the vaginal orifice and not further inward as well, if it were due to a gonorrheal infection, is hard to understand. Furthermore well-defined hymeneal atresia with normal genital tract has been observed *at birth.* The most direct explanation of hymeneal atresia is to consider such a hymen not as *imperforate* but as *occluded.* Kermauner thus explains

Digitized by Google

its formation: "Finally the closed hymeneal membrane is nothing more or less than an expression of excessive growth in the mesoderm. We can explain the origin of such deformities as an excessive growth, a sort of local giant-growth on a small scale." Blair Bell noticed particularly that the hymen in these cases "appeared to be irregularly attached to the surface of the obstructing membrane forming strands up to the periphery where it was tougher." His observations of such atresias and anomalous positions of the hymen outside of the vagina led him to support Pozzi's theory of the hymen as of vulvar origin. I agree with him that such observations point to the hymen as an active outgrowth of mesodermal tissue but I trust that the evidence I have presented tonight will convince him that *normally* the point where this outgrowth occurs is not in the vulva but in the vagina directly back of the eminential fold.

And now, most interesting of all, what is the purpose of this strange little structure, found only in certain apes and in the human race. Back of it must lie some story in our evolution that is well worth knowing more about. Its early pronounced fetal development points to its ontologic importance. Friedenthal has suggested that the purpose of the hymen may have been to protect the vagina from urine. To this I would object; (1) that urine is not irritating to the vagina unless it is retained there in a pocket; and (2) that only in an animal with the urethra above the vagina would there be such contamination. In the standing posture there is no appreciable greater contamination of the vagina with urine than in animals on all fours.

Klaatsch's theory is that in some way the hymen must have had to do with the manner of sexual intercourse of our progenitors. It may be true that such a hymeneal fold is less of an obstruction when relations are had from behind than in the normal human way but even so it is an obstruction rather than a guide as Klaatsch would have us believe. Certainly the many other lower animals who practice coitus from behind have not needed such a membrane. I do not see anything to justify such a theory.

To me the answer to this problem must be sought somewhere in the changes occurring in the transformation of the four-legged into the two-legged animal. Going hand in hand with these changes to the erect posture are those in the internal genital tract by which through the shortening of the vestibulum the vagina comes nearer to the surface. It is worthy of note that those American apes whose vagina is nearest to the outside have the best developed hymen. Now it is reasonably certain that our progenitors squatted on the ground far more than we. It must have taken a considerable period of time for the hind legs to have developed sufficiently to hold the body weight with-

Digitized by Google

out tiring. We still see racial tendencies to such a squatting habit among the Arabs and other tribes. The young baby goes through such a period of squatting. If we now picture a vagina that lies nearer the surface than in lower animals the squatting posture must have given rise to contamination with insects and irritating substances from the ground unless Nature had taken some means to offer protection. The usual conception of the labial folds is that they have such a protecting function and it does not seem unreasonable to suppose that the hymen similarly and in a more direct manner served to keep out foreign material from the vagina. Particularly during the first years of life before the labia and their hairy covering are fully developed would such a hymeneal fold serve a definite purpose. According to this view, then, the hymen dates back to the time when the progenitors of the human race squatted on the ground.

DISCUSSION

DR. W. BLAIR BELL, LIVERPOOL, ENGLAND (by invitation).—The problem, as it presents itself to me, resolves itself into two divisions, namely, is the hymen a new formation, or is it the remnants of a disappearing structure? Dr. Taussig says it is a new formation. I presume that he means that it is an overgrowth of connective tissue produced when the labia are developed at the roof of the external cloaca. It is impossible to discuss this subject properly without going into a good deal of comparative anatomy, not only of the internal but also of the external cloaca. This I cannot do now.

Dr. Taussig refers to the prominence of the hymen in the higher apes and in the human subject, but I differ from him when he says that this structure does not exist in the lower animals. It does, but it is not apparent because the urogenital sinus in the lower orders of mammals is long, and the hymen is at the top, at the junction of the urogenital sinus and vagina. The hymen is well developed in such an animal as the horse, but because it is situated high up it cannot readily be recognized.

Dr. Taussig referred to the papers I have written in connection with abnormalities in this region. I think I have myself shown definitely that the so-called hymenal occlusion is nothing of the sort. It is an occlusion of the lower end of the vagina, and in 60 per cent of cases almost invariably the lining membrane on the inside of these occlusions is columnar in part or entirety. One finds, in fact, a number of specimens in which there is columnar epithelium on the inside and squamous epithelium on the outside. It is interesting, too, that there can be found on the occluding membrane traces of the hymen, and in these remnants squamous epithelium is seen on both sides. Absence of the hymen is rare, and when it does occur it is my belief that there has been total instead of partial disappearance.

I am at present of the opinion that the hymen represents the remains of what we call the urogenital plate, that is to say, the anterior portion of the original cloacal membrane, which becomes divided by the urorectal septum into two parts. It is important to remember that whereas the vagina comes down from above and leads to central or partial disappearance of the urogenital membrane, the rear part of the cloacal membrane, which covers the site of the anus, is depressed upwards (or inwards) to meet the hind gut; consequently in the former a remnant is left, while no trace of the posterior part of the cloacal membrane in the region of the anus is apparent.

Digitized by Google

It is a very important matter that there are so many varieties of hymens. A cribriform hymen is what might be expected in a disappearing structure, not in a structure newly-formed in every case.

These are just arguments I present against Dr. Taussig's thesis to make the matter more interesting, for, as I have said, I cannot at present absolutely decide that the hymen is the remnant of the disappearing urogenital membrane as opposed to the view that it is a new formation.

DR. TAUSSIG (closing).—I am sure there is neither time nor would the members be especially interested in the pros and cons of the theories regarding the development of the hymen. In the time allotted I was able to present only a portion of the evidence obtained from the study of the serial sections in my twenty embryos. Certainly this evidence points strongly in favor of the development of the hymen as an actively proliferating connective tissue process rather than an obliteration membrane, either cloacal or vulvovaginal.

Digitized by Google

PERFORATING HEMORRHAGIC (CHOCOLATE) CYSTS OF THE OVARY

THEIR IMPORTANCE AND ESPECIALLY THEIR RELATION TO PELVIC ADENOMAS OF ENDOMETRIAL TYPE ("ADENOMYOMA" OF THE UTERUS, RECTO-VAGINAL SEPTUM, SIGMOID, ETC.)

By John A. Sampson, M.D.
Albany, N. Y.

(From the Gynecological and Pathological Departments of the Albany Hospital and the Albany Medical College.)

THE serious, though unusual, hemorrhage of ovarian origin into the peritoneal cavity simulating ruptured tubal pregnancy is well known to every abdominal surgeon, even though he may have encountered but few such instances in his own practice. The literature on this subject has been recently reviewed by Novak[1] and by Smith.[2] The larger ovarian cysts, also with hemorrhagic contents due to twisting of the pedicle of the cyst or from other conditions, are so obvious as to make it impossible to overlook them. Ovarian hematomas due to various causes have been reported by Savage,[3] Wolf,[4] Hedley,[5] Novak[6] and others.

There is, however, one type of hemorrhagic ovarian cyst or ovarian hematoma which should receive more careful attention; not only on account of its frequency but because of the nature of the adhesions resulting from the escape of its contents into the peritoneal cavity. These cysts are often bilateral and are usually small, from 2 to 4 cm. in diameter, though they are occasionally smaller than 2 cm. and larger than 4 cm. They apparently develop in women during their menstrual life, especially from 30 years of age to the menopause. I believe that many of the cases described by Savage,[3] Wolf[4] and Hedley[5] belong to this group. A very good example of this type of cyst is described by Smith,[2] under the title of hematoma ovarii.

At operation the ovary containing such a cyst is found to be adherent because of a previous perforation and is ruptured in freeing it. The perforation had been sealed by whatever structure the cyst, at that site, had become adherent to, such as the posterior wall of the uterus, posterior layer of the broad ligament or peritoneum of the side of the pelvis.

During some period in the life of these cysts (or possibly many times), material escaped from them into the peritoneal cavity which was very "irritating" and gave rise to adhesions. These adhesions occur most often in the dependent part of the pelvis, namely the culdesac.

Digitized by Google

The contents which escape, in freeing the cyst at operation, look like chocolate syrup. The amount varies with the size of the cyst, the size of the opening and the consistency of the contents. Adhesions are encountered which vary in extent, density and location in different cases. They may be slight, as those resulting from a mild pelvic peritonitis of tubal origin, or extensive and dense causing the parts involved to become fused with one another and thus making their separation extremely difficult. The most extensive and densest adhesions are usually found in the culdesac uniting the supravaginal portion of the cervix and lower portion of the posterior wall of the uterus

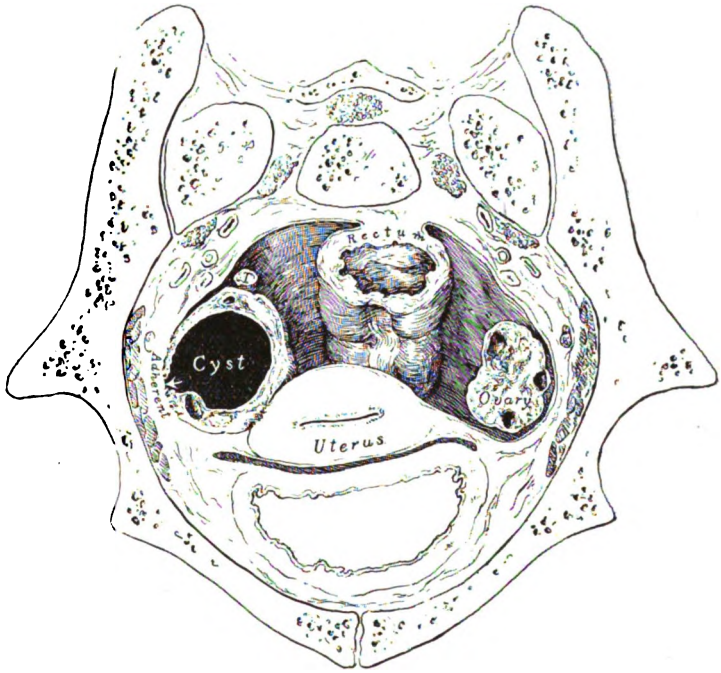


Fig. 1 (Case 11).—Gross section of the pelvis showing the condition found at operation; × ½. The ovarian cyst had ruptured and the perforation was sealed by the peritoneum of the side of the pelvis to which the ovary had become adherent. On freeing the ovary, its "chocolate" contents escaped. The histology of the ovary is shown in Figs. 2, 3 and 4. Tissue was not removed from the side of the pelvis adherent to the ovary to determine whether or not adenoma of endometrial type was present.

to the bottom of the culdesac and the anterior rectal wall. These adhesions vary in extent and degree in this situation and are sometimes so dense as to simulate malignancy. The operator deals with the individual case according to his best judgment at the time and usually considers the adhesions due to some previous pelvic inflammatory disease. For many years, this was my attitude toward this condition, and judging by the gynecologic textbooks which I have consulted (fifteen in number) all but two of the writers were either unaware of the adhesions resulting from the rupture of ovarian hematomas or

Digitized by Google

did not consider them of sufficient importance to mention them. The two authors who do mention them refer briefly to adhesions resulting from the rupture of an ovarian hematoma or hemorrhagic cyst.

I believe that the whole subject is of great importance from an economic, clinical, pathologic and even physiologic point of view. These cysts are of frequent occurrence. I have had fourteen cases during the year, May 1, 1920, to May 1, 1921, in 178 abdominal operations for pelvic conditions in women between 30 and 50 years of age. They affect women in a most valuable period of their lives, usually from 30 years of age to the menopause. The variation in size of the cysts, with the varying extent and denseness of the adhesions, leads to mistakes in diagnosis both before and during the operation. The smaller cysts with slight or moderate adhesions may be mistaken for pelvic inflammatory disease of tubal origin; the larger cysts with dense adhesions for malignant ovarian cysts and the dense adhesions in the culdesac for the implantation of cancer, or, when the rectal wall is extensively involved, for rectal cancer. Many kinds of operations have been performed to relieve the condition resulting from these cysts: conservative operations in which the adhesions have been severed, a portion of an ovary excised or one tube and ovary removed; radical operations, with the removal of the uterus, tubes and ovaries, and still more extensive operations in which a portion of the large intestine has been excised, with or without the removal of the uterus, tubes and ovaries.

Of histologic and pathologic interest is the finding in these ovaries of tissue of endometrial type lining the wall of the hematoma and also often in pockets in the ovary especially about the site of perforation. This tissue may also often be found in the structures which are involved in the adhesions, as the organ or tissue to which the ovary or cyst is adherent at the site of perforation and in the folds formed by the tube and ovarian ligament, the tube and the round ligament, the vesicouterine fold of peritoneum, about the uterosacral ligament, and bottom of the culdesac, namely, in places in which the hemorrhagic contents escaping from the rupture of the ovarian hematoma would be likely to settle. The most extensive development of this adenoma of endometrial type is usually found in the culdesac, sometimes as a localized thickening; other times as a diffuse growth involving the posterior surface of the supravaginal portion of the cervix, the posterior uterine wall, the bottom of the culdesac and the anterior wall of the rectum, all of which may be adherent to one another. The process may even extend out between the layers of the broad ligament or between the rectum and vagina, the latter giving rise to "adenomyoma of the rectovaginal septum."

Of physiologic interest, it is to be noted that the adenoma of

Digitized by Google

endometrial type developing in the ovary and arising in the portion of the pelvis as the result of the escape of the hemorrhagic contents of the ovary may be the seat of periodic hemorrhages, i.e., they may be "menstruating organs." Such hemorrhage or menstruation from the ovary would escape into the cavity of the cyst or into the peritoneal cavity to be absorbed or to give rise to secondary foci of adenoma of

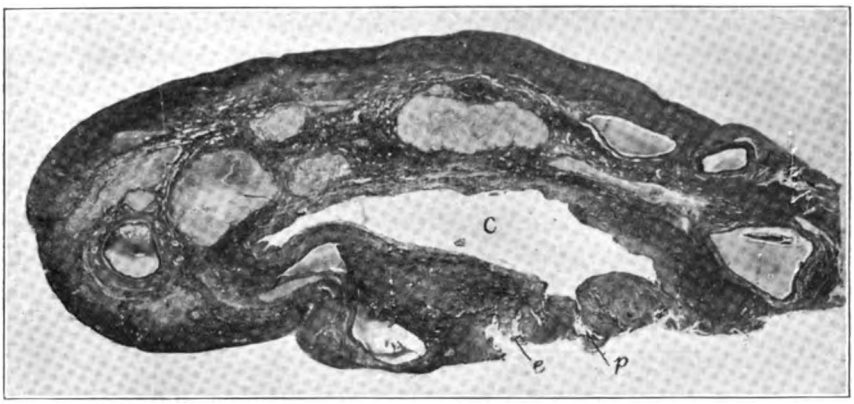


Fig. 2 (Case 11).—Enlagement (× 4) of a stained cross section of the ovary, cyst collapsed and empty. The cyst *c* is for the most part lined by low epithelium which lies directly on the ovarian tissue without any intervening stroma (Fig. 3). There are in the ovarian tissue about the perforation *p* depressions or small clefts *e* lined by columnar epithelium with gland formation and a stroma which is vascular and in places hemorrhagic. These areas strongly suggest misplaced uterine mucosa (Fig. 4). From a histologic study of this cyst one would hesitate to say that it is a hematoma of endometrial type. Nevertheless, hematomas may be found in "adenomyoma" of the uterus with a similar lining. The latter should be our standard of comparison in studying ovarian hematomas rather than the normal uterine mucosa (Fig. 6).

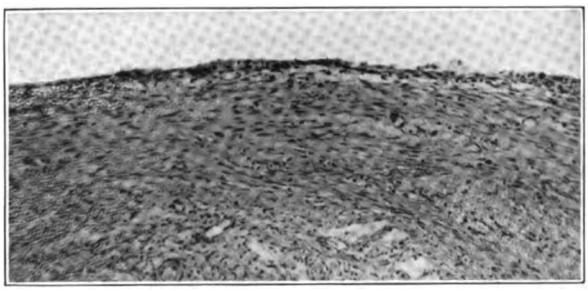


Fig. 3 (Case 11).—Photomicrograph of the wall of the cyst shown in Figure 2. The cyst is in places lined by a single layer of low to cuboidal epithelium resting directly on the ovarian tissue without any intervening vascular stroma. The condition is similar to that shown in Figure 6, a section of the wall of a hemorrhagic cyst due to the retention of "menstrual" blood in an "adenomyoma" of the uterus.

endometrial type in various portions of the pelvic cavity. The secondary pelvic foci usually remain quiescent except for slight hemorrhages into the lumen of the glandlike spaces forming small "hematomas" (hemorrhagic cysts). Sometimes they are invasive, and when so are apt to invade the uterus, forming an "adenomyoma" or they may grow down between the rectum and the vagina, forming an "adenomyoma of the

Digitized by Google

rectovaginal septum" and may penetrate the vagina and appear in the posterior vaginal vault. In other cases, they may extend through the wall of the rectum or sigmoid. The "menstrual" blood may escape into the vagina or the large intestine depending on which structure is penetrated by the growth.

THE INCIDENCE OF PERFORATING HEMORRHAGIC CYSTS OF THE OVARY

My attention was first directed to the dense peritoneal adhesions which may result from the escape of the contents of these cysts, in the year 1910 (Case 1). At the operation, March 8, of that year, a myomatous uterus with bilateral adherent, medium-sized ovarian cysts was found. When these cysts were freed, "chocolate" colored fluid escaped. The lower portion of the posterior uterine wall was firmly adherent to the rectum, and these structures were separated with great difficulty. The supravaginal portion of the cervix was so adherent to the rectum that a supravaginal hysterectomy was performed and the

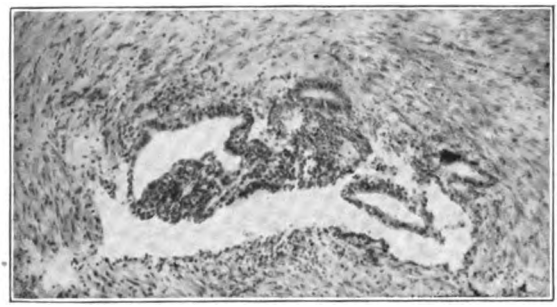


Fig. 4 (Case 11).—Photomicrograph of a small pocket (*e*) in the periphery of the ovary near the perforation of the cyst shown in Figure 2. Histologically, it closely resembles endometrial tissue, the epithelium, stroma and gland formation are the same. This tissue did not resemble the depressions lined by the typical surface epithelium of the ovary which were present in the same section.

pelvis drained through the dilated cervical canal. The anterior rectal wall felt so indurated after the removal of the uterus that I thought the patient might have a malignant growth of the rectum. I made a digital rectal examination before the patient left the operating room. While the induration in the anterior rectal wall could be distinctly detected, the rectal mucosa over it felt normal. The patient developed a postoperative ileus which was relieved by an enterostomy. She eventually recovered and has never had any trouble from the rectal condition. At the time I thought that the condition might be syphilitic and advised her family physician accordingly. In view of my present knowledge of these conditions, I believe that the adhesions probably arose from the cyst contents and that there was present an "adenomyoma of the rectovaginal septum." It was only after I had removed other similar cysts that I began to recognize that the adhesions ac-

Digitized by Google

companying these cysts arose from the escape of their hemorrhagic contents into the peritoneal cavity. I have since been impressed with the fact that the diagnosis of such a definite clinical and pathologic entity should be made before the operation.

The association between these cysts and "adenomyomas" of the posterior uterine wall with adhesions between it and the rectum was first observed by me, in 1912. March 27 of that year, I removed an "adenomyomatous" uterus in which the "adenomyoma" had apparently extended through the posterior uterine wall and had invaded the anterior wall of the rectum (Fig. 64, Case 2). On section, the

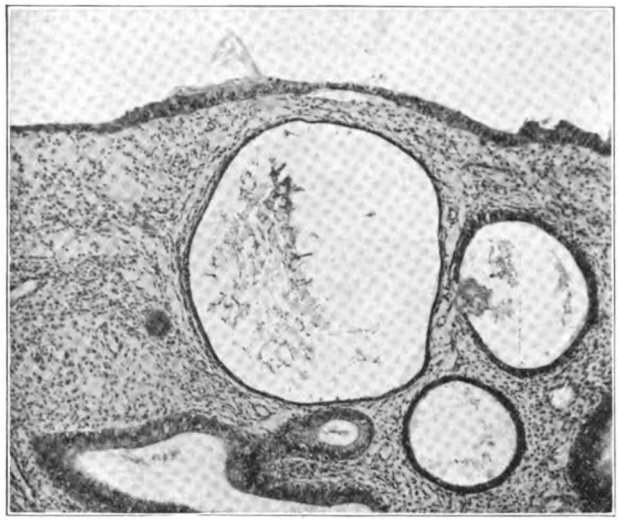


Fig. 5.—Photomicrograph of a portion of uterine mucosa showing glandular dilatation. The epithelium lining these glands is columnar, cuboidal or low varying with the dilatation of the glands. The greater the dilatation (distention), the lower is the epithelium lining the gland. The same holds true for hematomas of endometrial type whether of the ovary or the uterus. (Compare with Figure 3 and also Figure 6.)

"adenomyoma" was apparently not connected with the uterine mucosa. Bilateral perforating hemorrhagic cysts of the ovary were present. Just a month later I encountered a similar condition which would have been overlooked had it not been for the first, as the "adenomyoma" was much less extensive (Case 3 and Fig. 63). I did not observe another similar condition until June 13, 1918 (Case 6), but I undoubtedly had overlooked many. During the years 1918 and 1919, I observed these cysts many times and studied them more from the standpoint of gross pathology, basing the microscopic studies solely on the routine examination of the material in the pathologic laboratory. I found that this was inadequate, and therefore, I am reporting only a few of the cases observed by me during that period. Until a year ago, I believed that the adhesions arose solely because the contents were exceedingly irritating; that they contained a digestive ferment (menstrual) or

Digitized by Google

were infected by some bacteria. Cultures were made and proved sterile, and some experimental work on animals was done which will be considered later.

It was only this last year that I fully realized the true relation between these cysts and pelvic adenoma of the endometrial type and that the pelvic adhesions were often associated with or were in large part due to this adenomatous growth.

From May 1, 1920, Until May 1, 1921, I have operated on fourteen patients with these cysts, and in ten, an adenoma of the endometrial type was found in the organs or tissues which were adherent. In the four in which it was not found, the adhesions were slight, conservative surgery was performed and tissue was not removed from the adherent structures for microscopic examination.

PATHOLOGIC ANATOMY

A. Pathologic Changes in the Ovary.—As previously stated, these hemorrhagic cysts are found at operation to be adherent, and in freeing

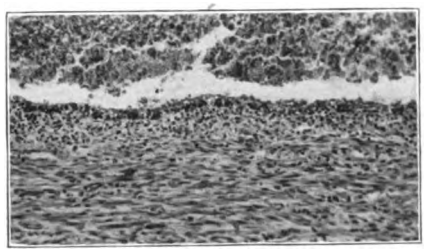


Fig. 6.—Photomicrograph of the wall of a hemorrhagic cyst (hematoma) present in an "adenomyoma" of the uterus. This hemorrhagic cyst is due to the retention of "menstrual" blood. It is lined by a single layer of epithelium, cuboidal on the left and low on the right. The epithelium rests on the uterine tissue with little or no evidence of an intervening "endometrial" stroma. The hemorrhagic contents of the cyst are shown retracted above the epithelial lining. Histologically, the lining of this hematoma (uterine) and the one shown in Figure 3 (ovarian) are similar.

them, the cyst is ruptured and some, or all, of its contents escapes. This rupture arises from reopening a previous perforation which has been sealed by the organ or structure to which the cyst has become adherent at the site of the perforation, or the cyst is torn in freeing it. Adhesions are also found in other portions of the pelvis and especially in the culdesac, and these adhesions are apparently the result of the escape of the contents of the cyst. The cyst with the evidence of a previous perforation is often the only apparent cause for the adhesions which occur in situations where fluid or contents from a ruptured cyst would tend to fall or accumulate. I have found at operation, in four instances, evidence of recent "hemorrhage" into the pelvis from this source. The situation and extent of these adhesions vary greatly in different cases. The pathologic conditions found at operation also vary and depend on many factors, such as the size of the cyst, its situa-

Digitized by Google

tion in the pelvis, whether unilateral or bilateral, the situation and extent of the adhesions and secondary changes associated with, or arising from, these, and finally other pathologic conditions in the pelvis which may occur in women of the same age incidence.

The size of the cysts has already been discussed. It is usually between 2 and 4 cm., occasionally larger; the largest one in this series was approximately 9 cm. in diameter. They are often bilateral, eight out of the twenty-three cases in this series; when unilateral, the right ovary was involved in nine, and in the left, in six instances.

The structure or organ to which the cyst is adherent at the site

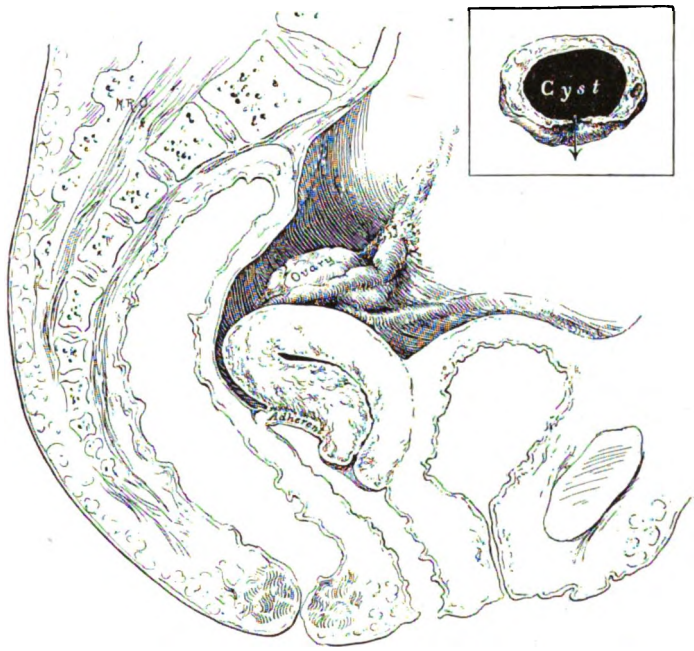


Fig. 7 (Case 10).—Perforating hemorrhagic cyst of the left ovary with adherent retroflexed uterus. Sagittal section of the pelvis; × ½. The cyst of the left ovary had ruptured, causing adhesions between it and the posterior layer of the left broad ligament and also between the posterior wall of the uterus and the anterior wall of the rectum. The histologic structure of the hemorrhagic cyst is shown in Figures 8, 9 and 10. Sections were not made of the adherent pelvic structures. Therefore, it was not determined whether or not adenoma of the endometrial type was present in these tissues.

of perforation varies. In this series of cases the posterior surface of the uterus was most frequently involved (Fig. 38); then the posterior surface of the broad ligament (Fig. 27); the peritoneum lining the side of the pelvis (Fig. 1), and in one instance the anterior surface of the broad ligament and the round ligament (Fig. 47), that is, any organ or structure which may be in contact with the ovary or cyst at the site of perforation. There are two rather characteristic features about the gross appearance of these cysts after their removal. One is the perforation with a raw area of ovarian tissue about it, where it

Digitized by Google

was adherent (Figs. 16 and 37), and the other is that these cysts usually differ from the ordinary retention cysts of the same size in that the walls are thicker, and after the contents have escaped, they stand apart and do not collapse to the same degree as do the others (Figs. 2, 17 and 28). The size of the perforation varies with the amount of trauma done at the time of operation in freeing the ovary. The situation of the perforation is of interest. I have always found it either on the lateral surface of the ovary (Figs. 16 and 37) or on its free border (Fig. 28), and have never found it on the mesial surface. Even when adherent to the posterior surface of the uterus, the ovary has been turned upward so that its lateral surface was in contact with the uterus (Figs. 37 and 43).

The appearance of the inside of the cyst varies in different specimens and often in different portions of the same specimen. In some instances,

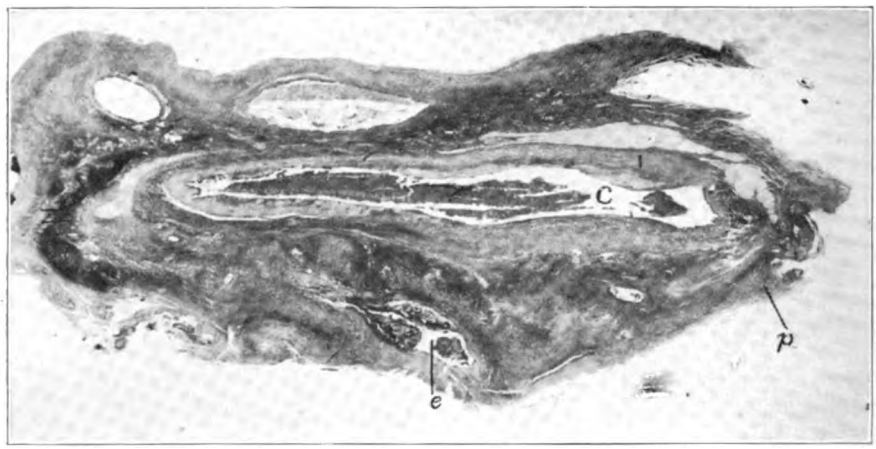


Fig. 8 (Case 10).—Enlargement (× 5) of a stained cross section of the ovary shown in the previous illustration. The cyst *c* is partially collapsed, with some of the "chocolate" contents still in its cavity. The wall of the cyst is for the most part lined by a single layer of epithelium (in places absent) which is low, cuboidal and columnar, and except near the site of perforation, lies directly on the ovarian tissue without an intervening stroma. In a few places, recent subepithelial hematomas are present and also in other places evidence of old hemorrhage as shown by pigmented cells. In the cyst wall near the site of perforation, a cellular stroma is present which contains glandlike structures lined by columnar epithelium, the picture resembling endometrium (Fig. 9). A small cyst or pocket is present lateral to the hemorrhagic cyst in which the lining more nearly resembles typical endometrium (Fig. 10).

nearly the entire inner surface is rough and brown owing to pigmentation from old hemorrhage. This is often true of the deeper portion of the cyst cavity (Figs. 16 and 17). In others, the lining of the cyst is for the most part smooth and gray, with or without areas of brown pigmentation or elevated red areas due to old or recent hemorrhages in the wall of the cyst. The smaller cysts of this series consisted of only one cavity while some of the larger ones were apparently multilocular with the loculi communicating with one another as though the cyst had ruptured into cystic follicles adjacent to it or there had been a fusion of several hematomas. Savage[3] has called attention to the

Digitized by Google

tendency of "hemorrhagic follicles" to rupture internally into each other.

Novak[6] has classified the various forms of ovarian hematomas thus: (1) follicular, including graafian follicle and atretic follicle; (2) corpus luteum, and, (3) stromal.

He believes that hemorrhage into atretic follicles is the most frequent form of follicular hemorrhage.

To this classification should be added a fourth variety of ovarian hematoma, namely, one lined wholly or in part by "endometrial tissue." Russell,[7] in 1899, published the report of a case in which uterine mucosa was found in an ovary. Lockyer[8] (page 328) pictures and describes a specimen of Semmelink and Joslin de Jong. The ovary was adherent to an "adenomyomatous" uterus. There was in the ovary a blood cyst lined in part by "adenomyomatous tissue" and with similar tissue in spaces in the periphery of the ovary. Casler,[9] in 1919, reported an

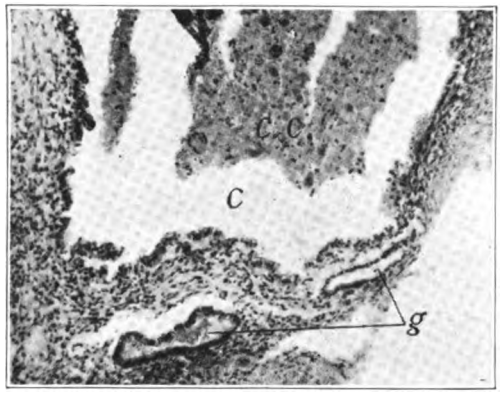


Fig. 9 (Case 10).—Photomicrograph (from another section) of the wall of the cyst *c* shown in Figure 8 near the perforation. This portion of the cyst is lined by a single layer of columnar cells resting on a cellular stroma. Glands (*g*) resembling uterine glands are also present in the stroma. *C* indicates the cavity of the cyst, and *C-C* its hemorrhagic contents. One would have little hesitation in calling this a hematoma of endometrial type and considering that the hemorrhagic contents are probably retained "menstrual" blood.

unusual case in which a patient menstruated through the vagina after a conservative hysterectomy in which one ovary was saved. The uterus was removed for an "adenomyoma" which contained stroma but no glands. At the second operation, four years later, the enlarged ovary was removed and it was found to contain cavities lined by "normal uterine mucosa." Cullen,[10] in his recent article, "The Distribution of Adenomyomas Containing Uterine Mucosa," describes three specimens of ovaries containing uterine mucosa, one sent to him by Dr. Charles C. Norris,[11] another by Dr. Otto Schwarz, and the third of his own, the latter occurring in an ovarian cyst lined with a brownish membrane. In all these cases, the histologic picture was similar to that of normal endometrium. In the study of ovarian hematomas to determine whether

Digitized by Google

or not the lining of the hematomas is of endometrial type, it would seem preferable to use as our standard of comparison not normal endometrium but ectopic endometrium in which there is a cyst (hematoma) formation due to the retention of "menstrual blood," similar to the condition in ovarian hematomas. We have abundant opportunity to study the variations in the appearance of the uterine mucosa in the hemorrhagic cysts or cavities, so often found in uterine "adenomyomas." These should be our standards of comparison in the study of ovarian hematomas because the physical conditions are similar. Even in the glandular hypertrophy of the mucosa lining the uterine cavity in which there is dilatation of the glands we may find these dilated glands lined by columnar, cuboidal and even low epithelium (Fig 5). In the hemorrhagic cysts of uterine "adenomyomas," the epithelium may also be columnar, cuboidal, low, or in places it may be absent. Further-

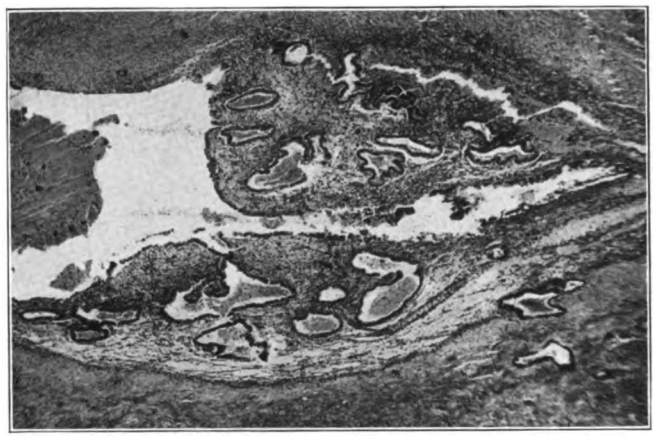


Fig. 10 (Case 10).—Photomicrograph of a portion of the pocket *e* shown in Figure 8. Histologically, the pocket is in part lined by "endometrial" tissue.

more in these cysts, the characteristic "endometrial stroma" may be very thin or even lacking entirely, the epithelium resting directly on the tissue of the uterine wall or the "myoma" (Fig. 6). In the ovarian hematomas that I am reporting, the histologic appearance of the portion of the cavities lined by epithelial tissue is identical with that of the uterine hematomas above mentioned except as altered by tissue peculiar to the ovary. These questions naturally arise: What is the source of this epithelium? Are these hematomas primarily of endometrial type or may an ovarian hematoma be secondarily lined by epithelium from another source?

Both Runge[12] and Wolf[4] have demonstrated the "epithelialization" of ovarian hematomas by the invasion of the "surface epithelium of the ovary," through the opening caused by the rupture. Runge, by serial sections made through the place of rupture, demonstrated that

Digitized by Google

the epithelium lining the cyst was continuous with that covering the surface of the ovary. Wolf's work confirms that of Runge, and he states that the epithelial cells invading and relining the cavity of the cyst may be low, cuboidal or columnar; when columnar it is due to lateral compression. He also believes that glandlike structures in the underlying stroma arise from a pushing downward of the overlying epithelium.

If these cysts are of endometrial type and if their epithelial lining

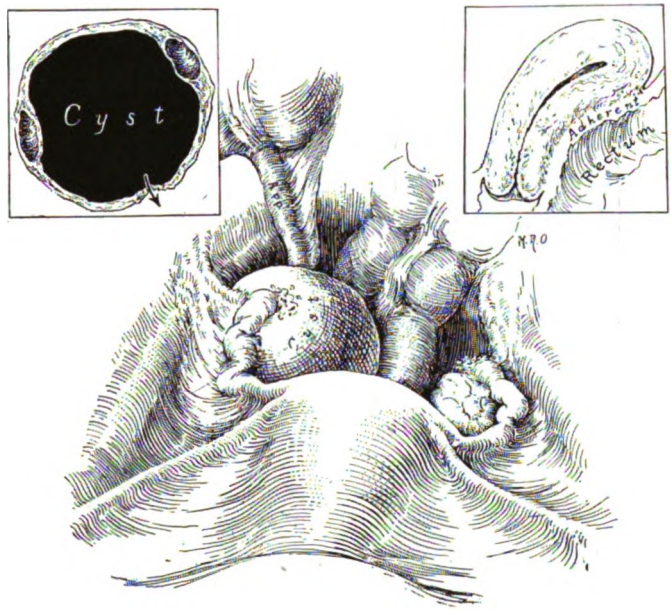


Fig. 11 (Case 5).—Perforating hemorrhagic cyst of right ovary with adherent retroverted uterus and adherent appendix. View of pelvic contents from above; × ½. The cyst of the right ovary had ruptured, causing adhesions between it and the side of the pelvis, and also between the posterior wall of the uterus and the anterior wall of the rectum. The tip of the appendix is firmly held in the pelvis by these adhesions. Only one section was made from the right ovary. This showed that the wall of the cyst in places was lined by cuboidal epithelium resting on ovarian tissue. Sections were not made from the raw areas created by freeing the uterus. Therefore, it was not determined whether or not adenoma of endometrial type was present in these tissues.

arises from the invasion of the surface epithelium of the ovary through the place of rupture, we must conclude that a metaplasia of this epithelium occurs, by which it may not only assume the histologic picture of endometrial tissue but may even function as such. It may be possible that, following the rupture of the hematoma or whatever structure preceded the secondary epithelial invasion, misplaced epithelium of endometrial type was present in the periphery of the ovary at this site and this epithelium was stimulated to become invasive and reline the cavity of the hematoma. We often find glandlike structures in the ovary, especially in its periphery, which are usually known as "cell inclusions." I believe that some of these glandlike structures are

Digitized by Google

due to misplaced epithelium of endometrial type which under "proper" stimulation might become invasive and actually reline the cavity of the hematoma through the opening caused by the initial rupture, or by hemorrhage into the lumen of the gland they may develop into "endometrial" hematomas. In three patients, recently operated on by me during the menstrual period, small hemorrhagic elevations were noticed on the surface of the ovaries. These were excised or the ovary removed, and in each instance, they proved to be due to hemorrhage about or into a space lined by tissue of endometrial type. I believe that this tissue was of endometrial type as shown both by its structure and by its function (menstruation).

In most of the specimens which I have examined it has been impos-

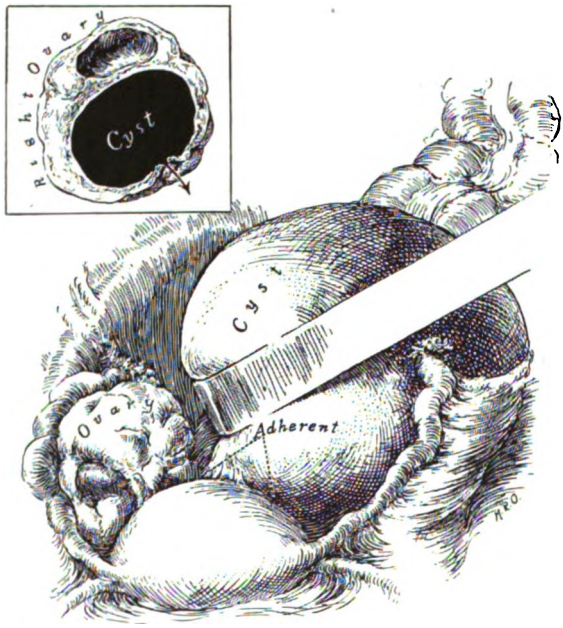


Fig. 12 (Case 9).—Perforating hemorrhagic cysts of both ovaries. View of the pelvic contents from above; × ½. The cyst of the left ovary is the largest of its kind I have seen, approximately 9 cm. in diameter. Both ovarian cysts had ruptured, the right ovary being adherent to the side of the pelvis and the left one to the posterior wall of the uterus, thus sealing their perforations. Only one section was made from each ovarian cyst, these showed that three cysts were in part lined by low cuboidal epithelium. Pigmented cells, evidence of old hemorrhage, were also present in the walls of the cyst. Sections were not made from the cysts at the site of perforation.

sible to determine the exact nature of these cysts before the initial rupture. They may have been endometrial cysts at the start; or they may have resulted from an abnormal condition of a follicle by which a hematoma arose in a graafian, or atretic, follicle; or possibly following ovulation, an abnormal corpus luteum developed, due to the invasion of the epithelial tissue as above mentioned. With my present knowledge, I prefer to mention these possibilities rather than make definite statements which later may prove to be incorrect.

Digitized by Google

The cysts which I have studied histologically, twenty-six in number, may be arranged into three groups.

First, a cyst in which a portion, usually the deeper, is lined by a wavy pigmented "luteal" membrane in various stages of retrogression; while another portion of the cyst, often toward the site of perforation is lined by epithelium, low, cuboidal, or columnar, resting on a vascular cellular stroma sometimes containing glandlike structures resembling uterine glands. In this stroma, one finds evidence of recent and also of old hemorrhage. The epithelial portion of the cyst strongly suggests misplaced atypical endometrial tissue both in structure and in function, namely, the evidence of periodic hemorrhage (menstrua-

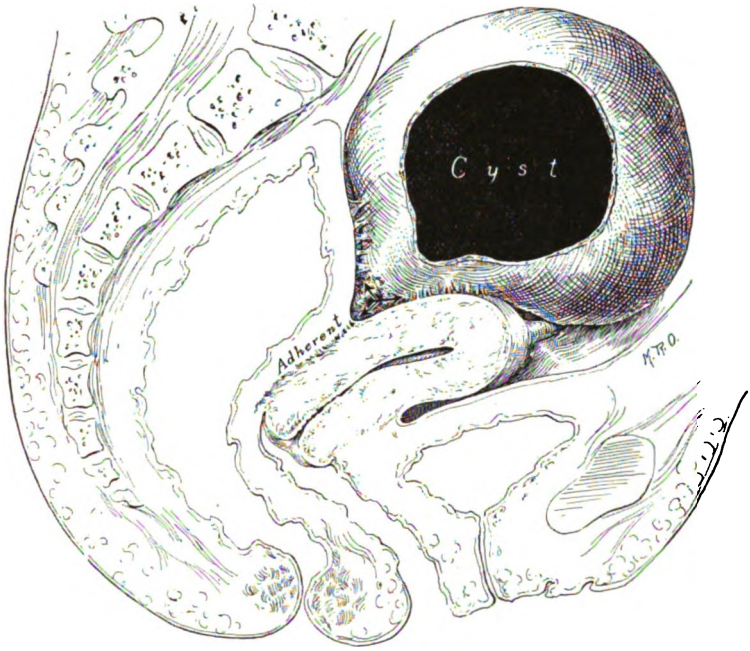


Fig. 13 (Case 9).—Sagittal section of the pelvis shown in Figure 12. The cyst of the left ovary is thin walled, the contents consist of dark hemorrhagic fluid like chocolate syrup. The anterior rectal wall is drawn forward and upward, having been firmly united to the lower half of the posterior wall of the uterus. Tissue was not removed from the posterior wall of the uterus or the anterior wall of the rectum to see whether or not adenoma of endometrial type was present.

tion). At the junction of the epithelial layer with the "luteal" layer the epithelium can be seen flattened and riding up over the retrogressing "luteal" membrane (Fig. 20), also described and pictured by Wolf. With the retrogression of the "luteal" layer and the advance of the epithelial lining, the hematoma may be gradually converted into a hematoma completely lined by epithelium of the endometrial type. This group represents either the development of an "endometrial" cyst from the invasion of a follicular hematoma by misplaced "endometrial" epithelium or else it represents the regeneration of the

Digitized by Google

epithelial lining of an "endometrial" cyst after a hemorrhage (menstrual), as indicated by the contents of the cyst, the pigmented "luteal" layer and the lesions in the pelvis. A good example of this group is shown in Figure 17.

The second group may represent a later, or even an earlier, stage of the preceding. The cyst is lined by epithelium, low, cuboidal or columnar, often with a narrow, underlying, vascular stroma with occasional glandlike structures, most evident about the site of perforation. The entire cyst is like the epithelial portion of the cysts described in the first group. The picture suggests periodic hemorrhages in the recent hematomas in the subepithelial stroma and in the pigmented cells in the same situation. A good example of this group

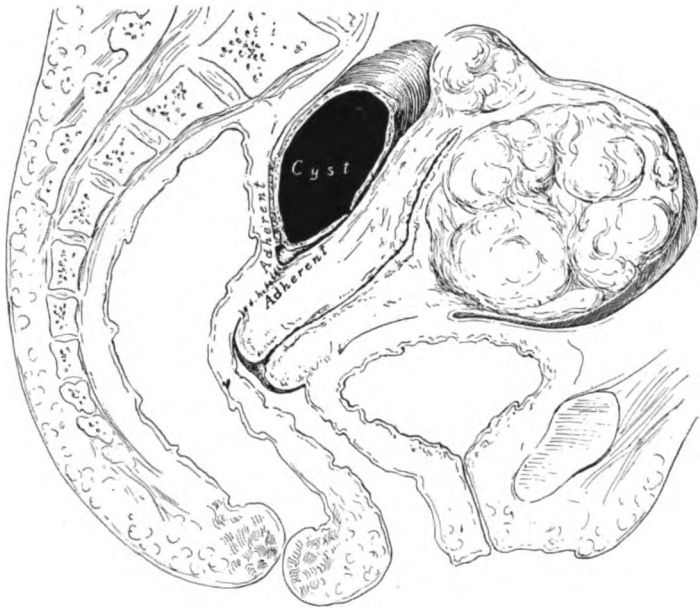


Fig. 14 (Case 8).—Perforating hemorrhagic cyst of left ovary, multinodular myomatous uterus, supravaginal portion of the cervix densely adherent to the anterior wall of the rectum. Sagittal section of the pelvis; × ½. The cyst had ruptured and the perforation was sealed by the posterior wall of the uterus to which the cyst had become adherent. Some of the contents of the cyst had escaped into the culdesac causing dense adhesions between the anterior rectal wall and the supravaginal portion of the cervix. The rectum is drawn upward and forward by these adhesions. Tissue from the posterior wall of the uterus was not examined to determine whether or not adenoma of endometrial type was present.

is shown in Figure 28. All gradations between the first two groups may be found.

The third group (well shown in Figures 2, 3 and 4), and the smaller one, is more difficult to recognize as an ovarian hematoma of endometrial type. The cyst wall is composed of ovarian tissue which lacks a vascular stroma and in places may also lack a definite epithelial lining. When the latter is present, it is usually low to cuboidal and rests directly on the ovarian tissue. However, tissue of endometrial

Digitized by Google

type is present in pockets in the periphery of the ovary about the perforation. The exact counterpart of the lining of this ovarian hematoma may be found in some of the uterine hematomas occurring in "adenomyoma" of the uterus (Compare Figures 3 and 6).

In studying any one of these cysts, certain questions naturally arise regarding the various stages in the development of the cyst prior to the present one and what would be its future stages if it had not been removed. Apparently, these cysts have a definite life history, with variations, in which they pass through various stages of growth or development to be followed by various stages of retrogression by which

Fig 15 (Case 4).—Perforating hemorrhagic cyst of the left ovary; multinodular myomatous uterus; "adenomyoma" in the right uterine cornu; adhesions; encapsulated cyst contents in the culdesac. Cross section of the pelvis; × ½. The cyst was badly torn in removing it, and the representation of pelvic contents was drawn from a sketch made just after the operation. Sections were not taken from the raw areas caused by the escape of the contents of the cyst and those made from the cyst were unsatisfactory.

the smaller cysts may "disappear" as they are apparently rare after the menopause. It is difficult to determine the duration of their life in any case. I believe it varies greatly in different cases and is not necessarily of long duration. I hesitate to state what I believe their life history to be because I am not sure that I am correct. It is true that we may possibly be dealing with several different kinds of cysts, but it is much more likely that most of the apparent different kinds represent various stages of growth or of phases (menstrual) in the life history of one variety.

Digitized by Google

One of the most interesting features associated with the ovaries containing these cysts is the clefts or pockets sometimes simulating small cysts, lined by epithelial tissue. These pockets are small and situated about the perforation, or they may be lateral to it. I have always found them on the lateral surface of the ovary or on its free border. The pockets are lined by epithelium of endometrial type and

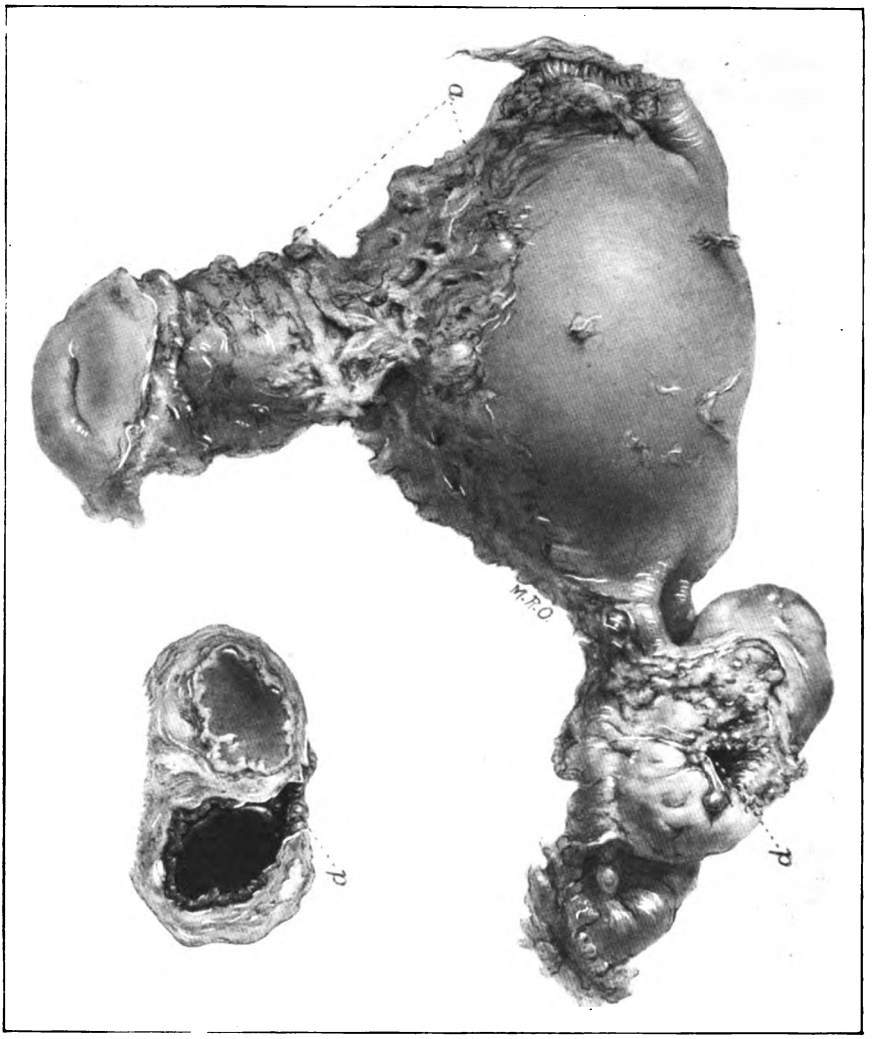


Fig. 16 (Case 21).—Perforating hemorrhagic cyst of right ovary; adenoma of endometrial type of the culdesac invading the posterior uterine wall and uniting it to the rectum. Posterior view of the uterus, right tube and ovary; × 1. Ovary is shown turned upward, with perforation on its lateral surface. A raw area is present about the site of perforation due to freeing the ovary from the side of the pelvis to which it was adherent. Longitudinal section of the ovary shows a corpus luteum in the proximal pole and a hemorrhagic cyst in the other. For microscopic sections of the cyst, see Figs. 17, 18, 19 and 20. Adenoma of endometrial type, with discrete "adenomyoma" in places, were present in the greater portion of the raw area of the posterior wall of the uterus. Sections through the nodule indicated in the short "arm" of the "pointer" *a* apparently demonstrate the development of "adenomyoma" of the uterus from epithelium deposited on its peritoneal surface by the escape of the contents of the perforating hemorrhagic ovarian cyst into the culdesac (Figs. 21, 22, 23, 24 and 25).

Digitized by Google

function; and the type may be more nearly normal than that lining its associated hematoma (Figs. 4, 10, 30 and 58). Both the hematoma and the clefts or pockets are apparently part of the same process. The

Fig. 17 (Case 21).—Enlargement (× 3) of a stained longitudinal section of the ovary. The deeper portion of the hemorrhagic cyst is lined by a thick, wavy, pigmented membrane. The rest of the cyst (toward the perforation) is lined by a single layer of columnar cells separated from the underlying ovarian tissue by a vascular stroma (Fig. 19). As the latter cyst lining approaches the pigmented "luteal" layer, its surface epithelium (now cuboidal or flattened) extends over the surface of the retrogressing "luteal" layer (Fig. 20). Tissue resembling typical endometrium (Fig. 18) is present both in the torn ovarian tissue within the perforation and in depressions on the surface of the ovary outside. Two interpretations of the picture could be made: first, following the initial perforation of the ovarian hematoma, epithelium of endometrial type situated in the ovary at the site of perforation was stimulated to invade the cyst and is gradually relining its cavity and converting it into an "endometrial" cystoma; or secondly, it represents the regeneration of the epithelial lining of an endometrial cyst after hemorrhage as indicated by the contents of the cyst, the pigmented "luteal" layer and the lesions in the pelvis. I believe the latter is the correct interpretation.

Digitized by Google

stimulus which causes the epithelial invasion of the hematoma or the development of an "endometrial" cyst also apparently causes the development of the clefts or pockets.

All phases of the hemorrhagic (menstrual) cycle may be observed in these hematomas and often in one hematoma. I judge the process of repair is not so rapid as in the mucosa of the uterine cavity, and the repeated hemorrhages may eventually destroy the cyst. The same hemorrhagic cycle may take place in the clefts or pockets as in the cyst proper. A "premenstrual" condition is well shown in Figure 28, as the patient was operated on the day that menstruation was due. Hemorrhage is present in the entire subepithelial stroma of the larger cyst and likewise in the clefts and pockets in the periphery of the ovary. All of the "endometrial" tissues of the ovary had responded to the "menstrual" impulse.

Evidence of old hemorrhage may be found in the pigmented cells in the subepithelial stroma of some of the cysts. As the "menstrual"

Fig. 18 (Case 21).—Photomicrograph of tissue in the wall of cyst at the site of perforation. Histologically, it resembles endometrium.

process in these cysts is similar to that of the uterine mucosa the blood escapes into the cyst cavity by the rupture of the subepithelial hematomas. One can also see how "menstrual" blood might at times escape into the pelvis; either leak by the site of the original perforation, from a secondary perforation or from the endometrial tissue in the clefts or pockets. The "menstrual" blood escaping into the peritoneal cavity may carry with it some of the epithelium lining the cyst cavity, or similar tissue may escape from the endometrial pockets in the periphery of the ovary about the perforation. This epithelium may become implanted in the culdesac or other portions of the pelvis and there give rise to other foci of "endometrial" tissue. The mechanism of secondary perforations of the cyst can be easily explained by a subepithelial hematoma developing in a thin portion of the cyst, the rupture of the hematoma so weakening the wall of the cyst that a perforation would occur.

Digitized by Google

B. The Adhesions Arising from the Escape of the Contents of These Cysts.—I judge that the amount of the cyst contents escaping into the peritoneal cavity is usually small, and clinically, it is rarely accompanied by any subjective symptoms.

The adhesions occur about the ovary at the site of perforation and in different portions of the pelvis where there are naturally folds or pockets in which such material would be apt to lodge, as has been previously stated in this paper. They vary greatly in degree and extent and may be slight, as those resulting from a mild peritonitis of tubal origin or so dense as to simulate malignancy.

Savage[3] has described these adhesions and believed that they arose from a reactive inflammation due to the escape of the hemorrhagic contents of the cyst. Hedley[5] has also described them and mentioned

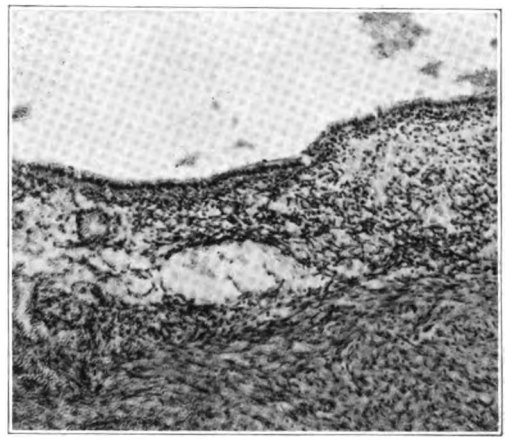


Fig. 19 (Case 21).—Photomicrograph of the wall of the cyst being relined or regenerated by the invasion of epithelium from the periphery of the ovary through its perforation or from epithelium not removed by the hemorrhage (Fig. 17). Histologically, the portion of the cyst marked "epithelial invasion" (Fig. 17) is lined by a single layer of epithelium with a vascular underlying stroma, in places containing pigmented cells evidence of past hemorrhages and in other places fresh blood evidence of a recent hemorrhage.

one case in which there was such a marked inflammation of the cellular tissue of the culdesac as to lead to a diagnosis of cancer of the rectum. He obtained a pure culture of *Staphylococcus pyogenes albus* in two cases and suggests this organism as a cause. Both Savage and Hedley call attention to the lack of gross evidence of tubal inflammatory disease.

I began to study the cause of these adhesions in the year 1918. Cultures were made both from the cyst contents and also from the pelvic cavity after freeing the adherent structures. Eight cases have been studied in this manner, and the cultures were sterile in all. Agar and blood serum were used as culture mediums. Dr. George S. Graham, in 1918, injected some of the material, obtained aseptically from these cysts, into the peritoneal cavity of rabbits. It caused ad-

Digitized by Google

hesions. This experiment was performed only in a few instances and was not controlled by injecting normal human blood.

I had planned to present a paper at the last meeting of the American Gynecological Society describing these cysts and the adhesions resulting from them. Some of the illustrations in the present paper were made from sketches prepared for the paper I had planned to read a year ago. At that time I believed that these cysts were "endometrial" hematomas and that the adhesions arose from the escape of "menstrual" blood into the peritoneal cavity. It differed from normal blood in that it was very irritating, and I thought that the irritation was probably due to some "digestive ferment." I still believe that these cysts are hematomas of endometrial type and their contents may be very irritating to the peritoneum. Up to that time, I had observed three patients with these cysts in which an "adenomyoma" of the pos-

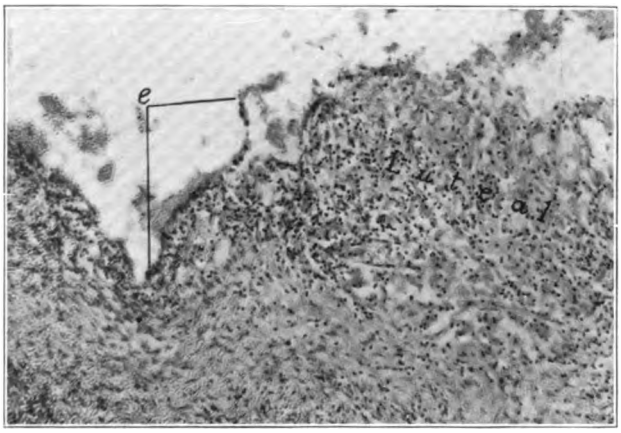


Fig. 20 (Case 21).—Photomicrograph of the wall of the cyst (Fig. 17) at the junction of the "epithelial" and "luteal" lining. The epithelial cells lining the portion of the cyst shown in Figure 19 have become cuboidal and flattened and can be seen extending (growing) over the retrogressing "luteal" layer. The "luteal" layer lacks an epithelial covering; and also the fibrous tissue lining found in typical corpus luteum hematomas. In time this cyst might be completely lined by "endometrial" epithelium as those shown in Figs. 28 and 39.

terior uterine wall was also present (Cases 2, 3 and 6 of this paper). The "adenomyomas" had "apparently" extended through the peritoneal surface of the posterior uterine wall and obliterated the culdesac, fusing the uterus with the rectum. The "adenomyomas" were apparently not continuous with the mucosa of the uterine cavity. I considered these three cases as further proof that the ovarian hematomas associated with them were of endometrial type. Developmental anomalies are often multiple and at that time I regarded these as instances of misplaced "endometrial" tissue in both the ovary and the posterior wall of the uterus. The adhesions between the uterus and the rectum in these three cases were identical in character with other cases of perforating hemorrhagic cysts in which "adenomyoma" had not been ob-

Digitized by Google

served. The tissue involved in the adhesions in the latter cases had not been examined under the microscope and therefore adenoma cannot be excluded. I thought that the adhesions in the three cases arose, at least, in part, from the rupture of superficial subperitoneal "adenomyomatous" spaces of the uterine wall which had become overdistended with menstrual blood. This also afforded an opportunity for the invasion of the anterior rectal wall and offered an explanation of the development of "adenomyoma" in the rectogenital space. Sections made of the posterior uterine wall show the adenomyomatous spaces which had been torn open in freeing the uterus from the rectum (Fig. 63).

During the last year, I have examined microscopically all tissue involved in these adhesions except when conservative work was done. Adenoma of the endometrial type was found in this tissue in ten of the fourteen patients with perforating hemorrhagic cysts of the ovary operated on by me from May 1, 1920, until May 1, 1921. In the four cases in which it was not found, the adhesions were slight, conservative work was done and the tissue involved outside the ovary was not

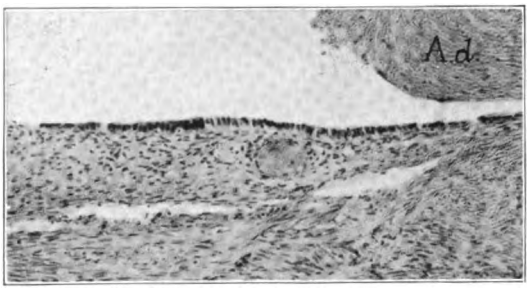


Fig. 21 (Case 21).—Photomicrograph of the posterior surface of the uterine wall near the nodule indicated in Figure 16. The surface of the uterus is here covered by columnar epithelium with an underlying vascular stroma similar to that shown in the "relining" of the ovarian hematoma by the "epithelial invasion" (Fig. 19). "*Ad*" represents an adhesion on the surface of the uterus. This change in the surface of the uterus is due to the escape of the contents of the cyst into the culdesac. Does it represent an epithelial implantation carried with the contents of the cyst or an "endothelial" metaplasia from the "specific" irritation of the cyst contents on the peritoneal covering of the uterus? I believe the former.

removed. During the month of May of this year, I operated on four patients with these cysts, and in all four adenoma of endometrial type was found in the pelvic tissue outside the ovary. These four specimens have not been sufficiently studied to be included in this paper. Of the twenty-three cases reported in this paper, pelvic adenoma of endometrial type was found in thirteen. In the remaining ten it was not found. I believe it might have been found in many, and possibly in all, of these ten cases had the tissue involved in the adhesions been carefully studied. It was examined microscopically in only one of these, and in that one not thoroughly enough to exclude adenoma.

All of the twenty-three cases reported in this paper were of value

Digitized by Google

in the study of the clinical features of this condition, and in most of them a satisfactory histologic examination of the ovaries was made.

Only the thirteen cases in which the tissue involved in the adhesions was examined histologically and adenoma was found will be considered in the following discussion.

These cases may be grouped according to the distribution of the adhesions as follows:

1. Extensive adhesions in the culdesac obliterating the lower portion of it and uniting the cervix or the lower portion of the uterus to the rectum; with adenoma of the endometrial type invading the cervical and the uterine tissues and probably also (but to a lesser degree) the anterior wall of the rectum.

2. Adhesions between the uterus and the rectum with multiple discrete invasions of the posterior uterine wall by adenoma of the endometrial type.

3. Adhesions in the normal peritoneal folds associated with the

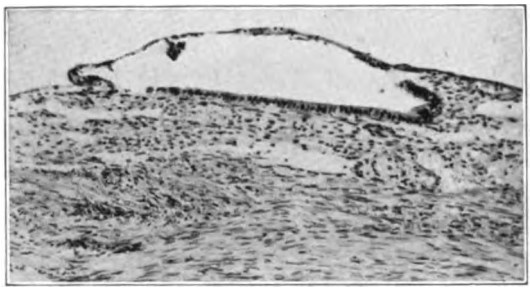


Fig. 22 (Case 21).—Photomicrograph from another portion of the section shown in Fig. 21. The epithelium is "sinking" into the underlying vascular stroma forming a dilated gland or bleb, apparently the second step in one form of development of adenoma of the endometrial type on the surface of the uterus.

development of adenoma of endometrial type, as, about the uterosacral ligaments; on the posterior surface of the broad ligaments between the tube and the ovarian ligament; on the anterior surface of the broad ligament between the tube and the round ligament, and in the vesico-uterine reflection of peritoneum.

4. Discrete nodules of adenoma in the wall of the rectum and sigmoid.

To describe in detail the conditions found in these thirteen cases would be but a repetition of the legends accompanying the illustrations and it would not be done so well.

Group I. Extensive adhesions in the culdesac uniting the cervix or uterus or both to the rectum with adenoma of endometrial type, is represented in nine cases (Cases 2, 3, 6, 12, 13, 15, 19, 21 and 23). In this group the material from the cyst escaping into the culdesac caused adhesions between the cervix or uterus and the rectum. The

Digitized by Google

adenoma of endometrial type apparently develops on the surface of the adherent structures (Figs, 21, 22, 23 and 24), between the adhesions, especially on the posterior surface of the uterus or cervix, and later may become invasive. The cervix or uterus is invaded more often, and usually to a greater extent than the other adherent structures (Figs. 59, 61, 36, 26, 34, 42, 62 and 64). Possibly uterine tissue "attracts" the adenoma; it is better suited for its growth. In some instances, the adenoma penetrates the uterus with very little reaction on the part of the tissue involved (Fig. 59). In others, the reaction is great, causing a diffuse or localized thickening, namely, an "adenomyoma" (Figs. 38, 44, 62 and 64). Adenoma may also be present in the tissues which are adherent to the ovary (Figs. 44, 45 and 51).

The epithelial lining of the ovarian hematomas, of the clefts and pockets on the surface of the ovary is similar to that of the adenoma in the tissues to which the ovary is adherent and in the adherent structures in the culdesac (Figs. 39, 40 and 41). The process in all is ap-

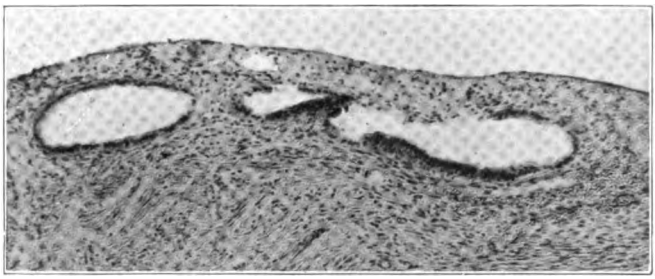


Fig. 23 (Case 21).—Photomicrograph from another portion of the section shown in Fig. 21. The dilated glands are completely embedded in the vascular stroma, which is thicker; apparently a third stage in one form of development of adenoma of edometrial type on the surface of the uterus.

parently the same whether in the ovary, in the cystlike cavities of the adenoma of the uterus, cervix, large intestine or in any other tissue, but is altered by the tissues involved and by physical factors caused by the retention of "menstrual" blood.

The question naturally rises, Which is primary? The study of my material has convinced me that the ovary is the primary site. Two methods of extension of the "endometrial" adenoma must be considered. First, extension, of the growth by continuity, and in some of the specimens, this may have occurred, and the second is by the implantation of epithelial cells carried with the contents of the cyst or from the epithelial clefts and pockets in the ovary. The implantation is analogous to the implantation of papilloma and cancer in the culdesac from the rupture of ovarian cysts containing these growths. The question of the origin of these secondary growths from metaplasia of the peritoneal endothelium due to the irritating action of the contents of the cyst will be considered later.

Digitized by Google

Group II. Peritoneal adhesions with multiple localized invasions of the uterine wall by adenoma.

This phenomenon was also observed in one of the cases of Group I (Case 21, Fig. 25). It was well demonstrated in Case 17, in which discrete "adenomyomas" were found in the posterior uterine wall beneath and about the adherent left ovarian hematoma (Figs. 44 and 46) and also the adenoma invading the uterine wall beneath the adherent right ovarian hematoma (Figs. 44 and 45).

Group III. Adhesion in the normal peritoneal folds of the pelvis associated with the development of adenoma of endometrial type in this tissue, as, about the uterosacral ligament; on the posterior surface of the broad ligament between the tube and ovarian ligament; on the anterior surface of the broad ligament between the tube and the round

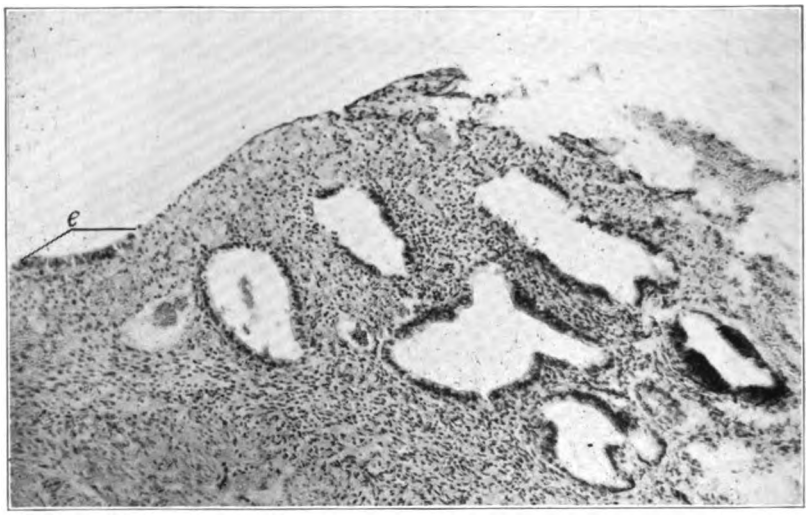


Fig. 24 (Case 21).—Photomicrograph from another portion of the section shown in Fig. 21. There is a marked hypertrophy of both the glands and the stroma forming an elevation on the surface of the uterus. Columnar epithelium is present on the surface *e* as in Fig. 21. This picture apparently represents a still later stage of development of the adenoma and is similar to the condition shown in Fig. 41 (Case 15).

ligament; in the vesico-uterine reflection of peritoneum and other similar folds where the contents of the ovarian cyst would be apt to lodge. There were two cases in this group, Cases 20 and 22. The illustrations, with their legends, of the specimens from these two cases picture the conditions found better than any verbal description (Case 20, Figs. 71, 73 and 74, and Case 22, Figs. 65, 67, 68 and 69). There were three interesting conditions found in the specimens of these two cases.

One is the lesion present about the left uterosacral ligament in Case 20 (Figs. 71 and 72). There is a localized thickening of the peritoneum with puckering about its edges, and in this thickened area

Digitized by Google

can be seen small pigment elevations, the surface of small cysts containing "old blood" (Fig. 72). Histologically, these cysts are small hematomas of endometrial type (Fig. 74). The second lesion is that occurring in definite peritoneal folds where the surfaces are adherent and an adenoma of endometrial type has developed (Figs. 65, 67 and 68). The adenoma developing in the adherent fold of peritoneum between the left round ligament and the anterior surface of the broad ligament had invaded the round ligament giving rise to an "adenomyoma" of that structure (Fig. 69). The third lesion is still more interest-

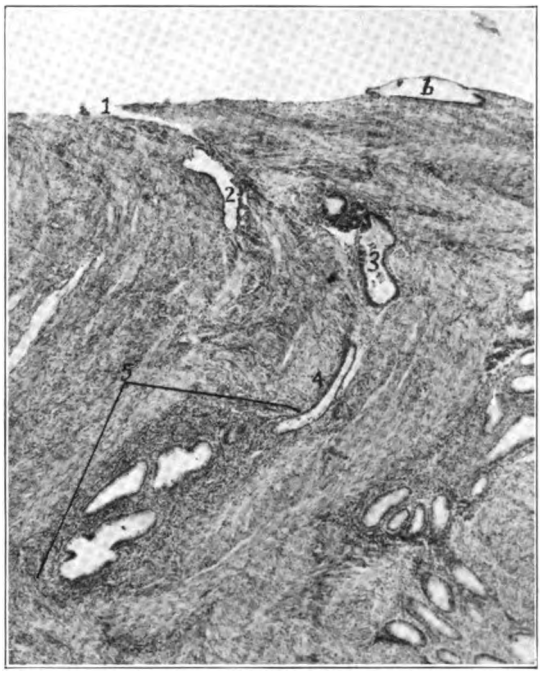


Fig. 25 (Case 21).—Photomicrograph from another portion of the same section as the preceding (lower power). *B* is the small dilated gland or bleb shown in Fig. 22. At 1 is the remains of epithelial tissue which had been almost completely "rubbed off" in removing the uterus. 1, 2, 3, 4 and 5 represent the invasion of the uterine wall by the adenoma. There is a marked (reaction) hypertrophy of the uterine tissue forming an "adenomyoma." This represents the final stage in the origin of "adenomyoma" of the uterus from epithelium deposited on its surface from the contents of a perforating hemorrhagic cyst of the ovary.

ing, that is, blebs or small peritoneal cysts, some containing blood, scattered over different portions of the specimen especially about the lesions in the adherent peritoneal folds (Fig. 68). Histologically many of these blebs are cystomas of endometrial type (Fig. 70). These blebs or cysts are very similar to the one shown in a pocket on the surface of the ovary near the perforation of the hematoma (Case 23, Fig. 50), and also in the development of adenoma on the surface of the uterus (Case 21, Fig. 22). The advocates of the serosal theory of the origin of adenomyoma would look on these specimens as supporting their views on the subject. A full discussion of this phase of the subject may be

Digitized by Google

found in Lockyer's[8] work on fibroids and allied tumors, in his presentation of the serosal theory and his chapter on extrauterine "adenomyoma." On pages 295 and 296, Lockyer expresses the following views of the advocates of this theory: "Heterotopy of serosal epithelium is the probable explanation of the existence of the epithelial spaces and cysts in most of the extrauterine swellings found between the rectum and genital tract," and again he states that "it has also been conclusively shown that the connective tissue which surrounds the 'endothelial' inclusions can be excited to hyperplasia which causes it to assume the characteristic histological features of the stroma of the uterine mucosa."

Fig. 26 (Case 21).—Sagittal section of the pelvis showing the relation of the culdesac adenoma of endometrial type to the uterus and rectum prior to operation; × ½. The adenoma arising in the culdesac "due to the escape of the contents of the cyst" has invaded the posterior wall of the uterus forming an "adenomyoma" and has united this portion of the uterus to the rectum posteriorly. One can see how this growth might extend posteriorly through the wall of the rectum or down between the rectum and vagina or through the vagina presenting in the vaginal vault behind the cervix as in Fig. 52, Case 24.

Group IV. Discrete nodules of adenoma in the wall of the rectum or sigmoid.

These occurred in two cases (Cases 12 and 19). In Case 12 it was situated in the anterior wall of the rectum back of the adherent uterus (Fig. 62). It was distinctly palpated on rectal examination prior to the operation. The rectal mucosa was freely movable over it. It was also palpated during the operation but was not excised. A positive statement cannot be made as to whether or not adenoma was present. The patient was operated on, June 5, 1920. I examined her, May 23, 1921, and was able to detect it; but it had decreased in size

Digitized by Google

probably due to the cessation of ovarian function, as both ovaries and the entire uterus had been removed. The second case (Case 19) was even more interesting. In addition to the adenoma of endometrial type of both ovaries (Fig. 54), and the posterior uterine wall (Figs. 55 and 59), two distinct nodules were palpated in the sigmoid. The upper one was not in contact with the adhesions about the ovaries and the uterus. The upper nodule was the larger and was excised, and the intestine was repaired by an end-to-end suture. Sections of this nodule showed that the adenoma had extended through the wall of the intestine into the submucosa and there formed small cysts dilated with "menstrual"

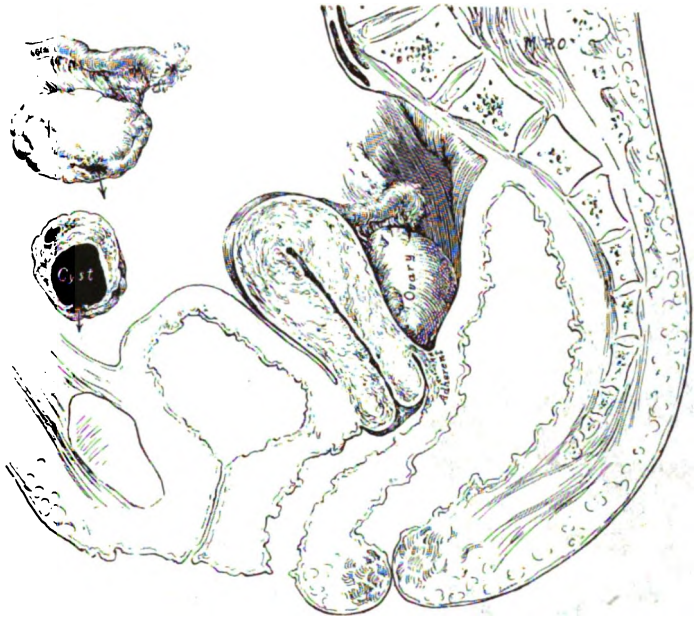


Fig. 27 (Case 13).—Perforating hemorrhagic cyst of the right ovary; ovary prolapsed and adherent; anterior wall of the rectum drawn forward by adhesions between it and the pelvic portion of the vagina. Sagittal section of the pelvis (X ½) showing the condition found at the first operation, June 28, 1920. Prior to the operation a small thickened area was palpated in the culdesac between the cervix and rectum. At operation, the right tube and ovary and the appendix were removed. Before leaving the hospital this thickened area was detected, and I realized that I had probably overlooked an adenoma of the endometrial type in the culdesac.

blood. Adenoma of endometrial type was found on the serous surface of the sigmoid beneath an epiploic appendage and in all the coats of intestine to, and including, the submucosa. Apparently some of the contents escaping from the ovarian hematoma had carried with them some of its epithelium, which was deposited on the surface of the sigmoid and later invaded it. The further description of this case will be reported in another paper. The lower and smaller nodule was not excised. The patient made a satisfactory recovery and so far has remained well. I am waiting with great interest to see whether or not the "adenoma" left in the sigmoid will cause her any further

Digitized by Google

trouble. Both ovaries and the entire uterus were removed and I hope and expect that the cessation of ovarian function will cause any adenomatous tissue which was left in the pelvis to atrophy.

I believe that a large percentage, and possibly all, of the ovarian hematomas reported in this paper were of endometrial type. The microscopic findings in all those examined showed in places a lining which resembled the lining of hematomas found in "adenomyomas" of the uterus, which apparently had arisen from the mucosa of the uterine cavity. The most typical endometrial formation was found in the portions of the hematomas about the site of perforation and in pockets or clefts in the periphery of the ovary about the same site. This would be expected, as in these situations the epithelial growth is not subjected to the pressure which is present in the hematoma proper.

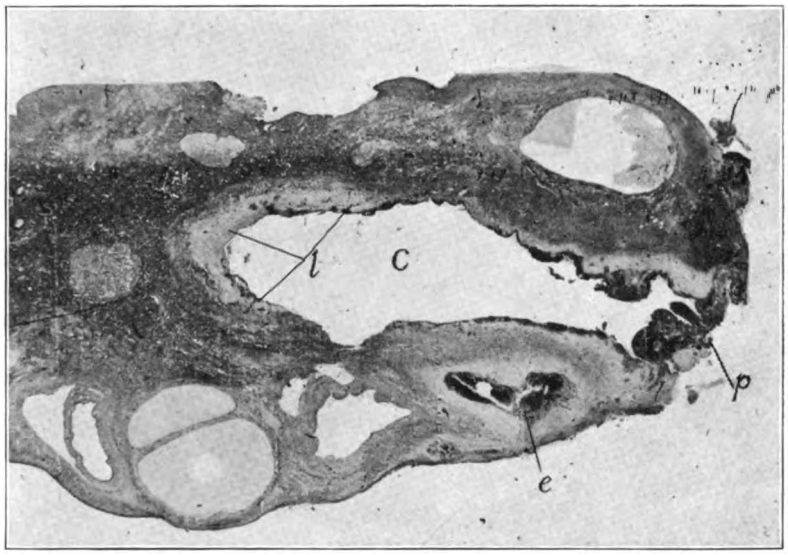


Fig. 28 (Case 13).—Enlargement (× 5) of a stained cross section of the ovary through the site of perforation. Patient expected to menstruate the day of the operation. It, therefore, represents a "premenstrual" condition. The chief features of interest are the larger collapsed hemorrhagic cyst *c*, the small cyst or pocket *e* (Fig. 30) and the ovarian tissue about the site of perforation *p* (Fig. 32). The wall of the cyst *c* is lined by epithelium, for the most part cuboidal, in places columnar, with a cellular stroma containing recent (premenstrual) hemorrhage which appears black in the picture. The columnar epithelial is most marked near the site of perforation where definite glandlike structures are present resembling uterine glands in cross section (Fig. 29).

The hemorrhagic feature of these cysts is similar to that of menstruation both in its gross manifestations and in the presence of subepithelial hematomas in the lining of the cyst, with evidence of rupture into its cavity. The hematomas manifest their activity during the menstrual life of the patient as does also the uterine mucosa. In two patients operated on at the time of the menstrual period, one the day that menstruation was due (Case 13, Fig. 29) and the other the last day of menstruation (Case 19, Fig. 57), the histologic changes in the

Digitized by Google

ovarian "endometrial" tissue corresponded to the phase of the menstrual cycle indicated by the menstrual history of the patient. The contents of the ovarian hematomas resemble old menstrual blood. The most important evidence that these ovarian hematomas and clefts or pockets are of endometrial type is the secondary development of adenoma of endometrial type in the tissues or structures, which have become "infected" by material escaping from them. The adenoma in these secondary pelvic foci may more closely resemble normal uterine mucosa than the original ovarian condition and may, in importance, overshadow the latter. "Menstruation" occurs in these pelvic foci and they may be the source of a further extension of the growth, just as it extended from the ovary.

From the standpoint of its origin, "adenomyoma" of the uterus may be divided into at least two groups:

1. The generally recognized group in which the growth has apparently arisen from an invasion of the uterine wall by the mucosa lining the uterine cavity, namely, invasion from "within" the uterus.

2. "Adenomyoma" arising from the invasion of the serous surface

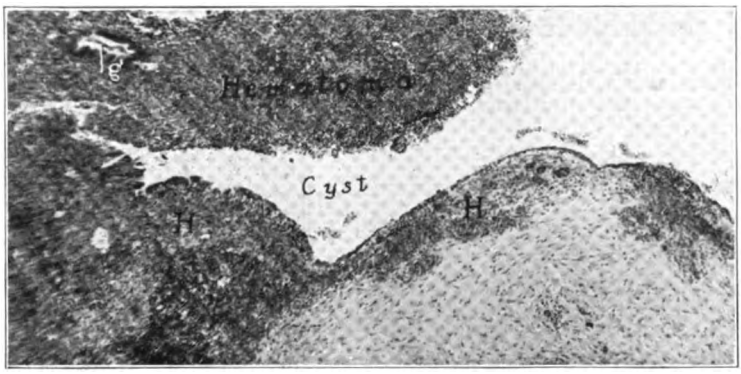


Fig. 29 (Case 13).—Photomicrograph of the wall of the cyst shown in Fig. 28, *c*, near the site of perforation. The cyst is lined by cuboidal and columnar epithelium with moderate and extensive subepithelial hemorrhage (premenstrual). A structure resembling a uterine gland is present at *g*. The cyst is an ovarian hematoma of endometrial type.

of the uterus by adenoma of the endometrial type secondary to adenoma of the ovary, namely, invasion from "without" the uterus. Histologically, the two tumors are identical. The advanced stage of the latter may very closely resemble the former in its gross appearance (Figs. 62 and 64). I presume that it is possible for the adenoma arising on the surface of the uterus to penetrate the entire wall and even reach the mucosa lining the uterine cavity.

I do not know whether or not there is a third group of "adenomyoma" arising from misplaced endometrial tissue in the uterine wall or by invasion from "without" from other sources than the ovary.

Granted that these ovarian hematomas may give rise to secondary

Digitized by Google

growths of adenoma of endometrial type in the pelvis, this question naturally arises, Are all ectopic pelvic adenomas of endometrial type secondary to a similar condition in the ovary? I cannot answer this

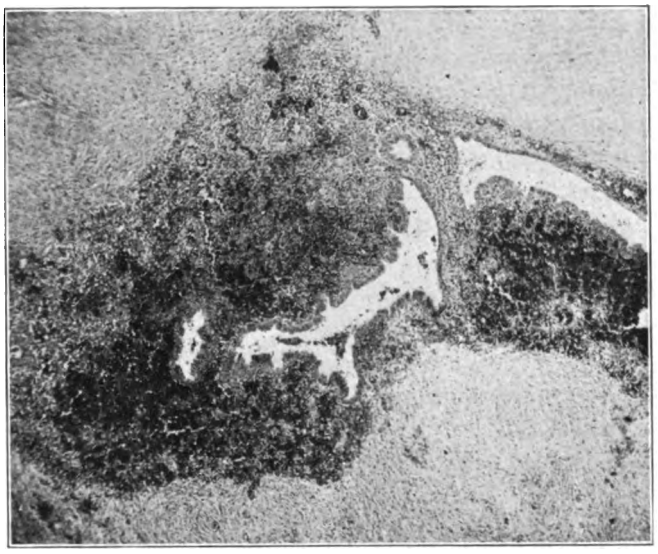


Fig. 30 (Case 13).—Photomicrograph of a portion of the small pocket shown at *e* (Fig. 28). The pocket is lined by columnar epithelium with extensive "premenstrual" hemorrhage in the underlying stroma (appearing black). The pocket is lined by tissue of endometrial type.

Fig. 31 (Case 13).—Photomicrograph of a dilated "gland" of endometrial type in the periphery of the ovary just above the pocket *e* (Fig. 28). Premenstrual hemorrhage (*H*) is present in the stroma about the "gland." All the "endometrial" tissue in the ovary had apparently reacted to the "menstrual" impulse.

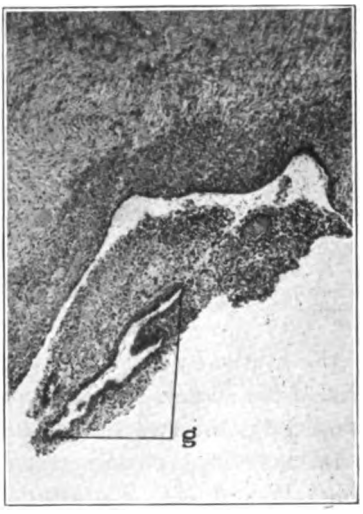


Fig. 32 (Case 13).—Photomicrograph of a "gland" of endometrial type in hemorrhagic tissue about the site of perforation *p* of the cyst shown in Fig. 28.

question. The origin of "adenomyoma" of the uterus from the mucosa of the uterine cavity has just been mentioned. Do we find these hematomas of the ovary in all other instances of ectopic pelvic aden-

Digitized by Google

oma of uterine type? In the thirteen cases of ectopic adenoma reported in this paper, hematoma of the ovary or ovaries in various stages of development and retrogression were found in all, and also in the four patients operated on by me during the month of May of this year and not included in this report. During the year, May 1, 1920, to May 1, 1921, I operated on two patients with pelvic adenoma of endometrial type without gross evidence of hematoma of the ovaries. In both instances, a small area of thickening of the peritoneum was found in the culdesac. In this area, small cysts were present which were lined by columnar epithelium and a stroma resembling endometrial tissue—conditions similar to that shown in Figs. 71, 72 and 74. There was a puckered area on the lateral surface of one of the ovaries in each case, which on microscopic section showed a space in the periphery of the ovary lined by columnar epithelium and stroma resembling endometrial tissue. These spaces of endometrial type could be interpreted as the remains of an "endometrial" hematoma in which nearly complete retrogression had occurred or "endometrial" pockets or clefts which had functioned, namely, had menstruated, and the secondary pelvic adenomas had arisen from them. From my studies, I am inclined to consider them possibly as either one or the other of these. It is also possible that their origin was independent of the ovaries.

A review of the reported cases of ectopic "adenomyoma" in the literature is of little value in determining their relation to ovarian hematomas as the writers were especially interested in the "adenomyoma" and probably paid very little attention to the condition of the ovaries unless they were strikingly abnormal. Sammelink and Joslin de Jong's case (reported by Lockyer and already referred to) in which the "adenomyoma" of the uterus had "invaded" the ovary would admit of a reverse interpretation and also a similar case (Case 6) reported by Cullen.[10] In Mahle and MacCarty's[13] case of "adenomyoma" of the sigmoid from the Mayo Clinic, "tarry" cysts of both ovaries were found. In the description of Cullen's[14] reported cases of "adenomyoma of the rectovaginal septum" an occasional reference is made to the fact that a "corpus luteum cyst" was found in one or both ovaries (four of his eighteen cases). Further studies alone will determine to what extent ovarian hematomas are responsible for the development of pelvic adenoma of endometrial type and by them we will also be able to determine which lesions are caused by the epithelial tissue carried with the contents of the cysts and which ones by the irritating action of the contents aside from this epithelial tissue. There is such a great variation both in the invasiveness of the pelvic adenomas and also in their finer histologic appearance that one wonders whether they are all the same. These are all problems for further study.

Digitized by Google

CLINICAL FEATURES OF TWENTY-THREE CASES

As has been mentioned earlier in this paper, this condition is a disease which develops during the menstrual life of women, especially from 30 years of age until the menopause. Only two of the patients were under 30, the youngest being 26. None had passed the menopause. The oldest was 47 years old. Twelve of the patients were from 30 to 40 years of age and nine from 40 to 47 years, inclusive. The age incidence corresponds to that of myoma of the uterus.

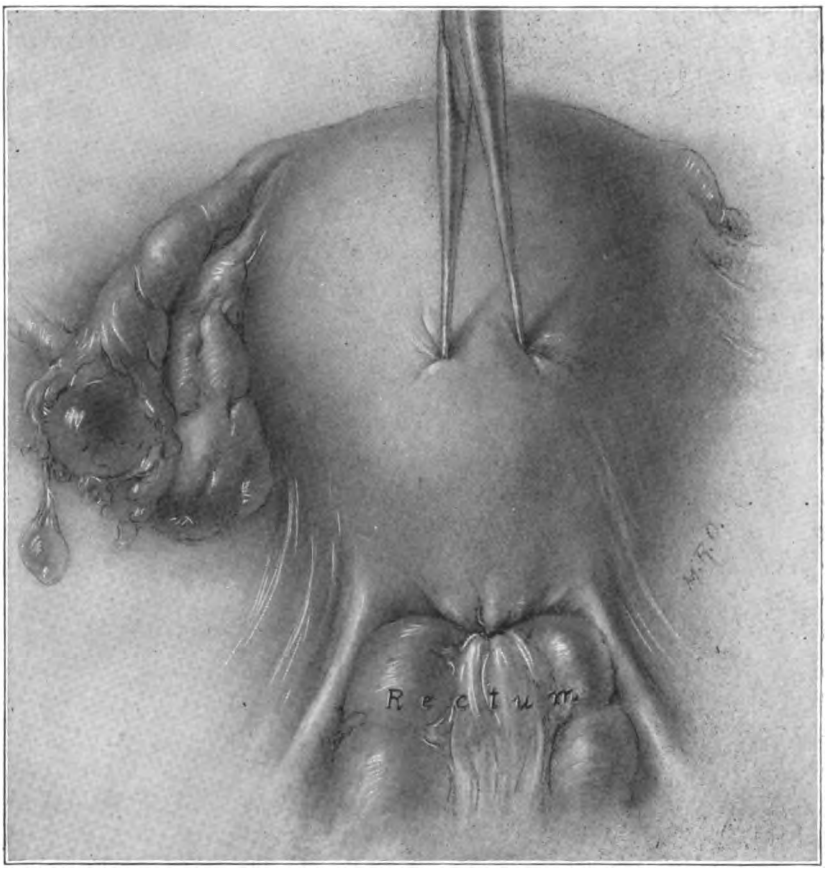


Fig. 33 (Case 13).—Condition found at the second operation, March 21, 1921. On drawing the uterus upward, the anterior wall of the rectum is carried with it as it is fused with the posterior wall of the cervix (Fig. 34).

Of the married women, fifteen in number, nine had never been pregnant. Of the six who had borne children, only three had had more than one. The shortest time that had elapsed since childbirth in any of these cases was five years. It would seem that this condition is likely to occur in women who were sterile; or if they had borne children, there was a subsequent history of sterility probably in part due to the age of the patient.

Digitized by Google

The most important factors in the origin of the subjective symptoms in these cases are the extent and situation of the adhesions and also other pelvic diseases which may be present. In some instances, other pelvic diseases are the more important conditions and in other cases the condition resulting from these cysts may predominate.

We are likely to find associated with these cysts any pelvic condition occurring in women from 30 years of age to the menopause. There are two possible exceptions in which a common age incidence does not

Fig. 34 (Case 13).—Adenoma of endometrial type involving the posterior wall of the cervix and the adjacent wall of the rectum. Sagittal section of the uterus removed at the second operation. The bottom of the culdesac has been obliterated by the adhesions resulting from or associated with the adenomatous growth and fusing the anterior rectal wall to the posterior wall of the cervix and the vagina. The adenomatous spaces have extended about half way through the cervix toward the cervical canal and have only slightly invaded the rectal wall and the vagina.

hold true; these cysts are more common in women who have not borne children, nine to six in the fifteen married women; they are apparently rare in women who have had salpingitis, a common condition in women over 30 years of age and also a common cause of sterility. In not a single instance of the twenty-three cases reported in this paper

Digitized by Google

was there any gross evidence of a recent or an old inflammatory disease of tubal origin; the fimbriated extremities of the tubes in all cases appeared normal and whatever adhesions were present about the tubes were of extratubal origin, that is, from the contents of the cyst.

The age incidence is that of uterine myomas which we would expect to find present in a large percentage of the cases; and this is true. Uterine myomas of varying size and numbers were found in ten of the twenty-three cases. In eight of these they were small and insignificant; in the other two they were larger (Cases 8 and 22) and gave rise to the tumor or condition for which the operation was undertaken. Even in these two cases the myomas were of secondary importance to the adhesions resulting from the hemorrhagic cyst. Cancer of the uterine cervix was found once, and the condition resulting from the hemorrhagic cysts in this case was of minor importance (Case 20). Retro-

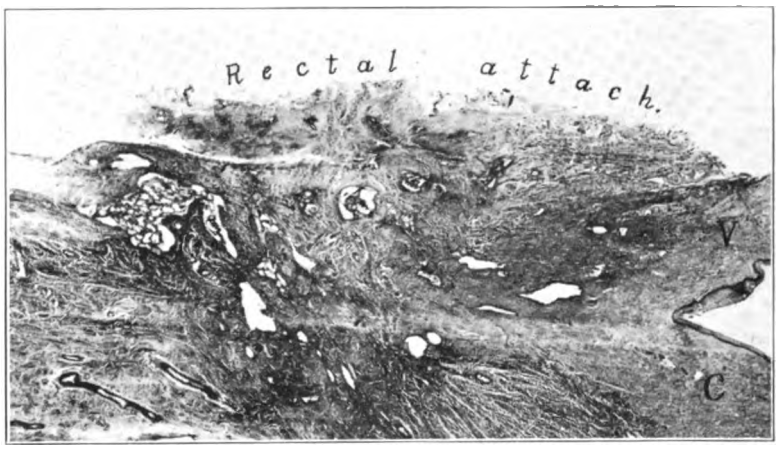


Fig. 35 (Case 13).—Stained longitudinal section of the posterior wall of the cervix (× 5) shown in Fig. 34. The growth has extended about half way through the cervical wall and has only slightly invaded the rectum and vagina. Many varieties of adenoma and adenocystoma of endometrial type are present, as, areas resembling normal endometrium, glandular hypertrophy, small cysts with low, cuboidal, or columnar epithelium with, and without, a stroma between the epithelium and the underlying cervical tissue. No connection between the cervical mucosa and the adenoma was found.

flexion or retroversion of the uterus was found in eleven instances, and in ten of these, adhesions between the uterus and the rectum were found. The condition under consideration must be looked on as a cause of adherent retroverted or retroflexed uterus, especially when the adhesions are situated between the rectum and the uterus.

The hemorrhagic cysts were usually small, from 2 to 4 cm. in diameter, only four were larger than 4 cm., the largest being approximately 9 cm., so the size rarely contributes to the subjective symptoms. Also whether they are unilateral or bilateral probably has little bearing on these symptoms except as bilateral cysts may contribute to sterility. They were bilateral in eight of the twenty-three cases.

Digitized by Google

The situation and extent of the adhesions may or may not contribute to the subjective symptoms as in patients with adhesions due to other conditions. The menstrual history varied greatly. Painful menstruation was a symptom in eleven cases, while on the other hand, twelve of the patients menstruated without any pain. When one considers the many factors causing or contributing to dysmenorrhea, it is often difficult to determine the part played by any pathologic condition found in a single case. I believe adhesions due to these hemorrhagic cysts may cause painful menstruation, especially as in

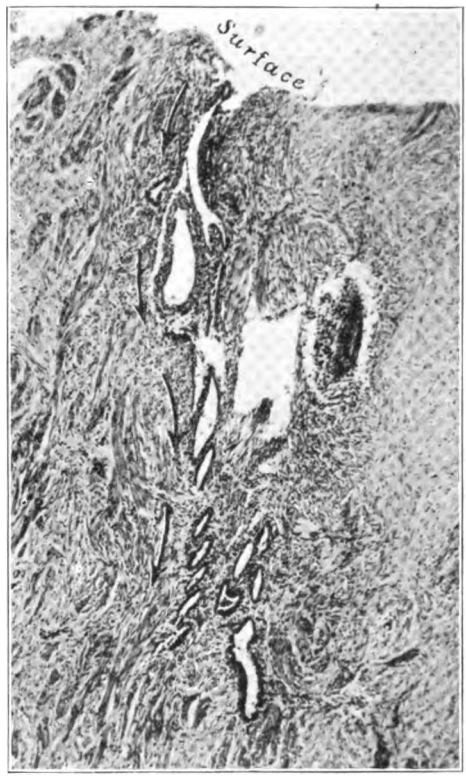


Fig. 36 (Case 13).—Photomicrograph of a portion of the posterior wall of the cervix showing the invasion of the adenoma into the cervical tissues from the peritoneal surface of the cervix, i. e., from "without."

Cases 2, 4, and 22 in which the dysmenorrhea was of recent development and had increased in severity. The amount of the menstrual flow varied greatly in the cases in this series. It was moderate or scanty in fifteen, profuse in six and intermenstrual bleeding occurred in two. In the six with profuse menstruation, intramural myomas were found in three; in two of which they were small, in two of the others a retroflexed uterus and hemorrhagic cyst were the only pathologic conditions present. In the sixth case, there was an extensive adenoma of the posterior uterine wall apparently not connected

Digitized by Google

with the uterine mucosa. Of the two with intermenstrual bleeding, one had a cancer of the uterine cervix, in the other the pathologic conditions found were an adherent retroflexed uterus, bilateral ovarian hemorrhagic cysts and a small intramural myoma. It is very difficult to decide whether or not these cysts cause profuse or irregular (too frequent) menstruation.

Eight of the twenty-three patients did not have pain as a leading symptom. In three of these the adhesions were very extensive. Fifteen, however, did have pain. In three of these, the pain was probably

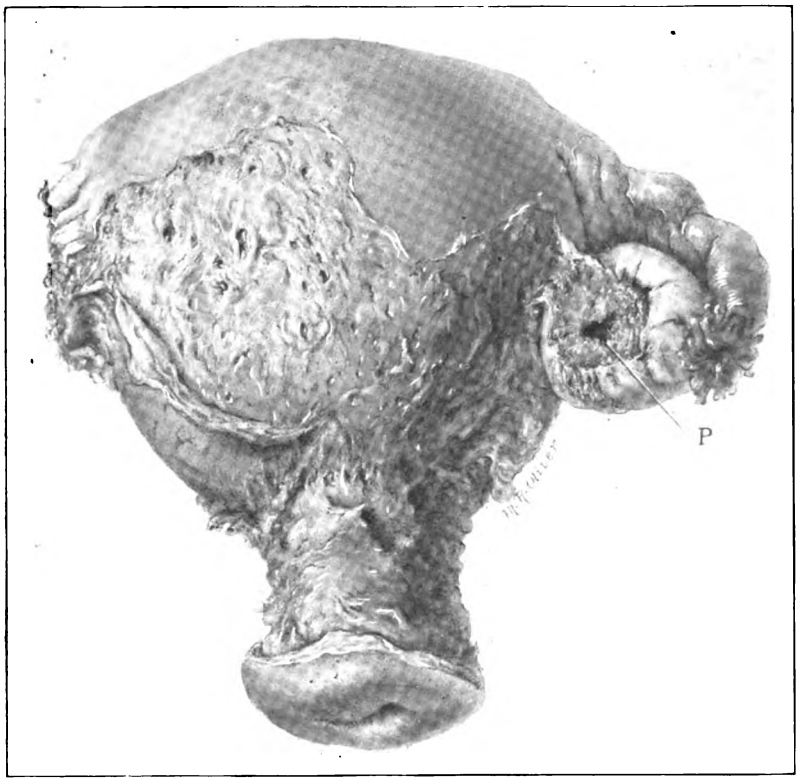


Fig. 37 (Case 15).—Perforating hemorrhagic cyst of the right ovary with diffuse superficial adenoma of endometrial type of the posterior uterine wall which had fused with the anterior wall of the rectum and the bottom of the culdesac. Posterior view of the uterus, right tube and ovary natural size). The ovary had been freed at operation from the posterior surface of the uterus to which it was adherent. It is shown partially collapsed with a raw area and perforation in the center of it. The greater portion of the posterior wall of the uterus, represented by the large raw area, was adherent to the rectum and bottom of the culdesac. The small dark depressions and areas represent adenomatous tissue (blebs) (Fig. 41) which had been exposed or torn in freeing the uterus from the rectum and bottom of the culdesac and the ovary. The small elevations on the surface of the fundus above the large raw area represent superficial subperitoneal adenomatous blebs which had not been ruptured.

due to trouble with the appendix. In the other twelve cases, the adhesions resulting from the ovarian cysts or cyst were the apparent cause of the pain. The pain varied in severity and location as does pain due to adhesions from any other cause. There is usually nothing character-

Digitized by Google

istic about the pain present in this condition nor is there necessarily any relation between the extent of the adhesions and the severity of the pain. Only one patient gave a history of an acute onset with symptoms of peritonitis (Case 2). In all the others the onset was gradual. Four of the patients suffered greatly from constipation which amounted to partial obstruction in one instance (Case 19).

Of the twenty-three patients, six presented symptoms due to other conditions and the hemorrhagic cysts were accidental findings. In seventeen of the twenty-three cases, the prominent symptom or symptoms were probably due to the cysts themselves or adhesions resulting from them. In twelve of the seventeen, pain was the one symptom

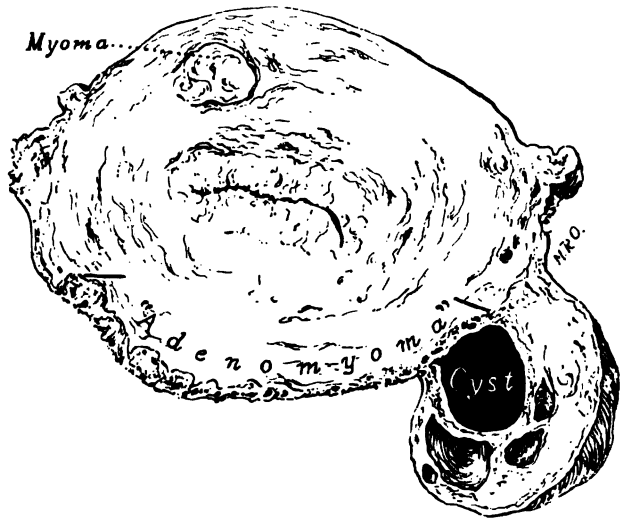


Fig. 38 (Case 15).—Cross section of the uterus with right ovary attached to the posterior uterine wall. The perforation in the ovary has been sealed by its attachment to the posterior wall of the uterus. The adenoma apparently beginning in the right ovarian cyst had extended across the entire posterior surface of the uterus at this level. There is a reaction of the uterine tissue about the glandular areas forming an "adenomyoma." Sections made through the entire uterine wall showed that the adenoma had invaded it only for the distance indicated in the illustration, and that none was found between this area and the uterine cavity.

from which the patient sought relief, in three increasing constipation, in one uterine bleeding and in one sterility.

SUMMARY OF CLINICAL FEATURES

The age at which such cysts with their sequelae occur is usually between 30 years and the menopause.

There is often a history of sterility or of no children in several years. Sometimes there are not any subjective symptoms referable to this condition. If painful menstruation results, it is of the acquired variety, of recent development and may be progressive in severity.

If pain is present, it is not characteristic but varies in character as does pain associated with pelvic adhesions due to other conditions.

Sometimes constipation, worse at the menstrual period, is a sug-

Digitized by Google

gestive symptom (Case 19). The symptoms of the advanced cases with narrowing of the lumen of the intestine are similar to those of intestinal obstruction due to other causes such as malignancy.

The physical signs vary greatly. If the cysts are small and adherent to the posterior surface of the uterus it may be difficult or impossible

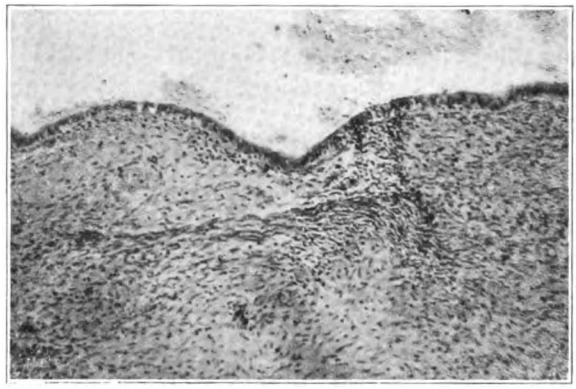


Fig. 39 (Case 15).—Photomicrograph of the wall of the hemorrhagic cyst shown in Fig. 38. The entire cyst cavity is lined by a single layer of cuboidal or columnar cells with an underlying vascular stroma.

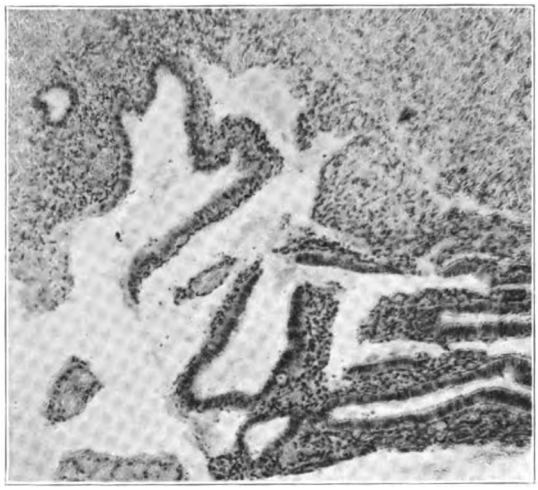


Fig. 40 (Case 15).—Photomicrograph of a cleft in the ovary near the site of perforation of the cyst. The cleft is lined by tissue of endometrial type resembling the normal endometrium more closely than that lining the cyst.

to detect them. If they are adherent to the posterior layer of the broad ligament or the side of the pelvis they are more readily palpated and simulate adherent cystic ovaries or hydrosalpinx due to pelvic peritonitis of tubal origin. If the cysts are of medium size or larger and their adhesions are extensive the condition may simulate a malignant ovarian cyst (Case 9). The palpatory findings in the culdesac, when

Digitized by Google

present, are the most characteristic physical signs. The uterus is often retroflexed or retroverted and adherent and the degree of adenomatous growth in the culdesac varies greatly in character in different cases. When slight, it is impossible to detect it. The involvement may be localized or diffuse. If localized, the area of induration may be flat or nodular, in the median line just behind the cervix or laterally in the region of the uterosacral ligaments. The induration is usually low down, but occasionally may be higher up. Sometimes it is best detected on vaginal palpation and at other times felt best through the rectum. The diffuse and extensive involvement of the culdesac simulates the implantation of ovarian cancer or papilloma in this situation. The implantation from the latter source, however, is usually more extensive and much thicker.

The extensive involvement of the rectogenital space by "adenomyoma" is well described by Lockyer[8] in his excellent work on fibroids and allied tumors and by Cullen[10] in his published cases of "adenomyoma of the rectovaginal septum."

From this it can be seen that it is possible to make a tentative and often a probable diagnosis in a large percentage of the cases prior to operation. As we may diagnose a papillomatous or malignant ovarian cyst by palpating a cystic pelvic tumor which is usually adherent and in addition find "involvement" of the culdesac due to the implantation of the growth in that situation, in like manner we are often able to diagnose this type of ovarian cyst with its secondary involvement of the culdesac. It differs from the malignant growth in that the ovarian tumor is usually much smaller, the culdesac involvement usually less and more localized, appearing as a nodule of localized thickening. The general clinical picture also is not that of malignancy.

TREATMENT

The operative treatment of any pelvic condition must be determined by many factors, such as the pathologic condition present, the age of the patient, her desire for conservative surgery, the results of the operative treatment of similar conditions and especially the natural course of the disease when no operation was performed. There are obviously two pathologic conditions to treat, the one present in the ovary or ovaries, and the secondary adhesions in the pelvis which are often associated with an adenoma of endometrial type, the latter varying greatly in the degree to which it has invaded the tissues and organs involved.

One would suppose that with the establishment of the menopause ovarian function would cease and that then the tissues of endometrial type, wherever situated, would not only cease to grow but would actually atrophy. I believe this is the rule; undoubtedly, there may be

Digitized by Google

an occasional exception. I have never found one of these cysts or a pelvic adenoma of endometrial type in a woman after the menopause.

To remove the pelvic adenoma and disregard the ovarian condition would be to leave the original growth behind, and furthermore, the persistence of the ovarian function might increase the growth of secondary pelvic adenomas not removed. *Certainly we would not sanction the surgical judgment of the operator who removed the secondary peritoneal implantations of ovarian papilloma or cancer and did not remove the primary ovarian tumor.* The conditions are analogous except that fortunately the adenoma of endometrial type is only rarely sufficiently invasive to cause serious damage to the parts involved. By referring to the report of the cases in this article, one may see that various operations have been performed.

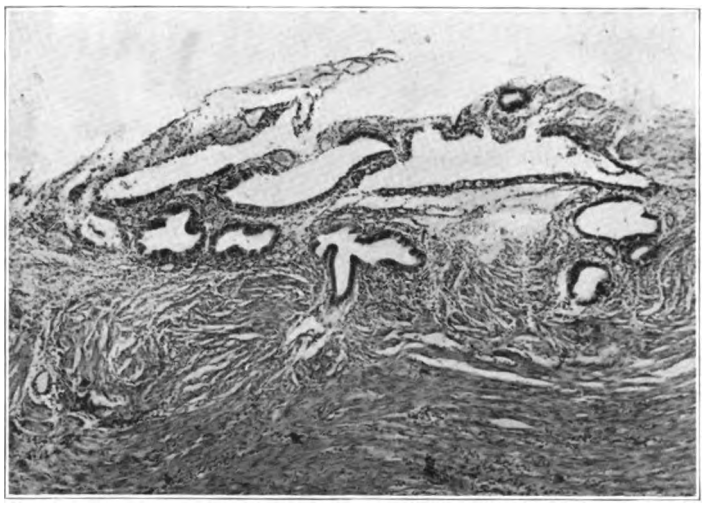


Fig. 41 (Case 15).—Photomicrograph of a section of the posterior uterine wall showing adenoma of endometrial type on its surface similar to that shown in Fig. 24 (Case 21). As indicated, it is beginning to invade the uterine wall. The process in the ovarian hematoma, in the clefts of the ovary about the site of perforation, and the posterior surface of the uterus are the same, namely, an invasive adenoma of endometrial type. Apparently, the uterine involvement is secondary to the ovary by direct extension or implantation from the epithelial contents of the cyst.

In some of the conservative operations, only the diseased portions of one or both ovaries have been removed (Cases 14 and 16). In others, one tube and ovary have been removed without excising the pelvic tissue in which adenoma was probably present (Cases 9, 10, 11 and 13). In still others, the entire uterus was removed, leaving behind one tube or ovary or a portion of an ovary and pelvic tissue was removed at the same time, which showed adenoma of endometrial type (Cases 15, 18 and 21). In the last group of cases, adenomatous tissue was undoubtedly left in the pelvis.

In one of these conservative cases, a second operation has been

Digitized by Google

necessary (Case 13); and in this instance, the adenoma in the culdesac had increased in size in less than a year's time and necessitated a radical operation. I believe that some of the other cases, in which I have employed conservative surgery, may later require secondary radical operations as Cases 10 and 11. Casler's[9] case already referred to is an extreme example of the possible result of conservative surgery in these cases. Only the end-result in a large number of cases of conservative ovarian surgery will show whether or not it is justifiable. Even if it proves to be justifiable, I am sure that an occasional patient will require a secondary radical operation. It is possible that the rupture of the cyst at operation may "infect" the pelvic tissues with

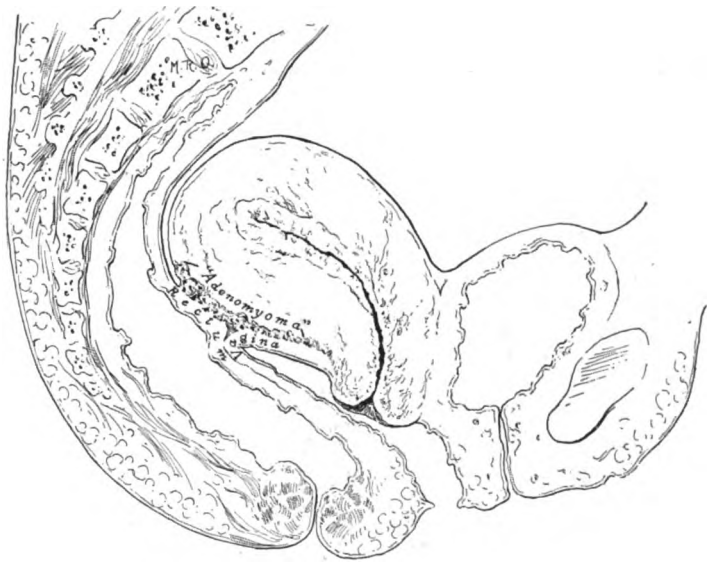


Fig. 42 (Case 15).—Sagittal section of the pelvis showing the relation of the "adenomyoma" to the uterus, rectum and vagina prior to the operation. The adenoma involves the superficial portion of the posterior uterine wall and has united it to the anterior wall of the rectum and posterior wall of the vagina. The upper part of the vagina has been pulled away from the rectum by the retroflexion. One can see how the adenoma would easily grow down between the rectum and vagina, invade the vaginal wall, and present in the vaginal vault behind the cervix, as in Fig. 52 (Case 23).

the epithelial contents of the cyst and that the retained ovary or ovaries may stimulate it to further growth.

I have never resorted to the extremely radical operations, as in cancer of the uterine cervix, and even in these operations it may be impossible to remove all of the adenomatous growth. In the radical operations which I have employed, I have removed the entire uterus with both ovaries, and in freeing the uterus from the rectum, I have purposely kept close to the uterus, undoubtedly sometimes leaving adenoma in the rectal wall. In freeing the cervix laterally, I have kept close to it, in one case intentionally leaving adenoma in the broad ligament because it was too extensive to remove (Case 12). Only the

Digitized by Google

end-results of a large number of cases will show whether or not this type of radical operation is the one of choice. Undoubtedly, in any type of operation, no matter how radical, adenomas may sometimes be left in the pelvis, but with the removal of all ovarian tissue, I believe it will usually cease to grow and may atrophy (Cases 2, 3, 6 and 12).

In one instance (Case 19), I removed the entire uterus, both tubes and ovaries, a portion of the sigmoid; and in this case, adenoma was undoubtedly left in the anterior wall of the rectum and a distinct

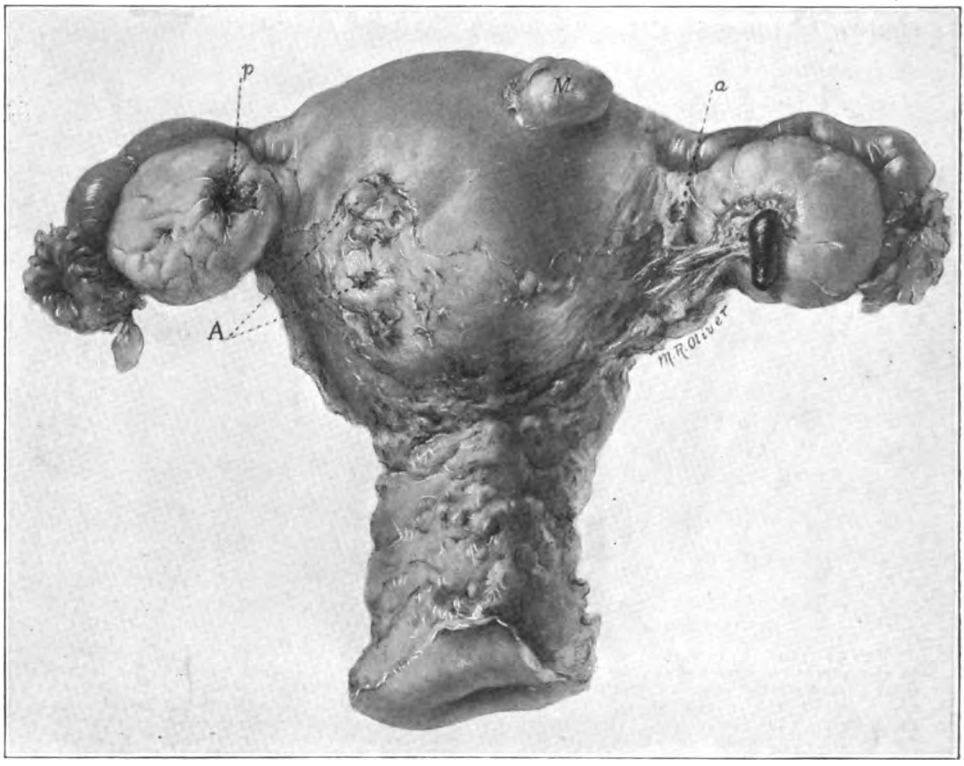


Fig. 43 (Case 17).—Perforating hemorrhagic cysts of both ovaries with discrete "adenomyomas" of the posterior wall of the uterus. Posterior view of the uterus, tubes and ovaries (natural size). At operation both ovaries were adherent to the posterior surface of the uterus. The left ovary is partially collapsed, due to the escape of the contents of the cyst; the raw area with perforation in the center is shown. The contents of the hematoma of the right ovary was thicker than that of the left and is indicated as oozing from the perforation. At and about the surface of the uterine wall which was adherent to the left ovary can be seen slight elevations (*A*) which proved to be superficial "adenomyomas" (Fig. 46). Adenoma of endometrial type was found developing between the adherent right ovarian ligament and the surface of the uterine wall at *a*, Fig. 45. Sections were taken from other portions of the uterine wall and adenoma was not found.

nodule in a portion of the sigmoid was not removed. I am anxiously awaiting the end-result in this case. So far she has been completely relieved and feels perfectly well.

There seems to be a great variation in the degree of "invasiveness" of the secondary pelvic deposits which is often evident in the individ-

Digitized by Google

ual case at operation. My present plan is to employ ovarian conservatism (excising the portion of the ovary or ovaries involved) or removing only the apparently diseased ovary in patients who desire to have the ovarian function maintained but only if the invasion of the pelvic tissues by the adenoma is slight. I am anxiously waiting to see whether the end-results will justify this stand. I am inclined to believe that ovarian conservatism is a rather dangerous experiment. In all other cases, either when ovarian conservation is not strongly desired or when the pelvic growth is apparently actually invasive, I believe that all ovarian tissues should be removed and as much as possible of the pelvic growth with it. We must not lose sight of one fact, and that is that for many years we have been operating on these patients without realizing the exact nature of the disease. On the whole, the results have usually been quite satisfactory because the

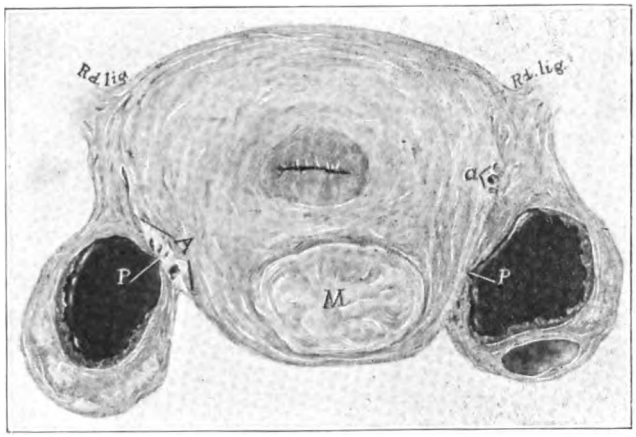


Fig. 44 (Case 17).—Cross section of the uterus and ovaries showing their relation prior to the operation (natural size). The ovaries are adherent to the posterior surface of the uterus at the site of perforation. The deeper portions of the ovarian cysts were lined by a wavy pigmented layer without an epithelial covering, while the proximal portions (toward the perforations) were lined by low, cuboidal and columnar epithelium, i. e., possibly a secondary "epithelialization" from the surface or periphery of the ovary about the site of perforation or regeneration of the epithelial lining of the cyst after hemorrhage, as in Fig. 17. Adenomas of endometrial type were also present in the periphery of the ovary. Discrete superficial adenomyomas (*A*) are situated in the posterior uterine wall beneath the adherent left ovary at the site of perforation (Fig. 46), and adenoma of endometrial type is found developing between the right ovarian ligament and the uterine wall at *a* and invading the latter (Fig. 45).

growth is usually only mildly invasive. With a better knowledge of this subject and by following up our cases, we should soon be able to determine the proper treatment of this condition.

REPORT OF CASES

Case 1.—*Perforating hemorrhagic cysts of both ovaries; multiple leiomyomas of the uterus; dense adhesions in the culdesac uniting the anterior rectal wall to the supravaginal portion of the cervix and the lower portion of the uterus. The induration of the anterior rectal wall was so great as to simulate malignancy.*—Mrs. M. G., aged forty-six, complained of an abdominal tumor, of six months'

Digitized by Google

duration, and constipation. She had never been pregnant; menstruation had been more profuse lately but regular and without pain. Pelvic examination revealed an adherent irregular "uterine" tumor, extending half way to the umbilicus. The preoperative diagnosis was a multinodular myomatous uterus, associated with pelvic adhesions, probably of tubal origin.

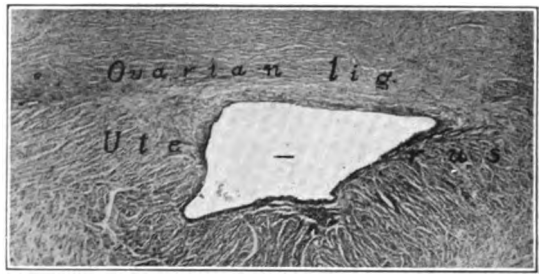


Fig. 45 (Case 17).—Photomicrograph of adenoma of endometrial type developing between the adherent right ovary and the uterus (Figs. 43 and 44). The adenoma can be seen sinking into the uterine wall.

Operation at the Albany Hospital, March 5, 1910, demonstrated a multinodular myomatous uterus with adherent bilateral hemorrhagic ovarian cysts. Further details of this case have already been described in the text of the article in the section on incidence. The ovarian cysts and posterior wall of the uterus were not examined microscopically.

CASE 2.—*Perforating hemorrhagic cysts of both ovaries; "adenomyoma" of the posterior wall of the uterus, adherent to and invading the anterior wall of the rectum.*—Miss B. K., aged thirty-seven, complained of profuse menstruation and indefinite pains in the lower abdomen. The menstruation was regular, profuse, more so lately, and accompanied with severe pain. Pelvic examination revealed the uterus to be slightly enlarged and apparently adherent, with "inflammatory

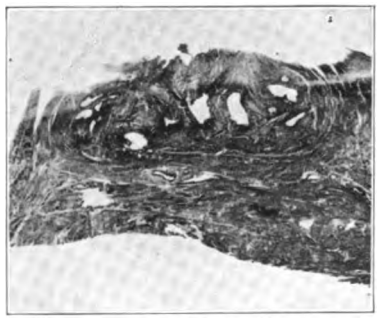


Fig. 46 (Case 17).—Enlargement (× 5) of "adenomyoma" situated in the posterior wall of the uterus beneath the adherent left ovary (Figs. 43 and 44). Several sections were made of the posterior uterine wall and adenoma of endometrial type was found only in the portions of the uterine wall to which the ovaries were adherent, suggesting an intimate relation between the adenoma of endometrial type of the ovary and that developing in the uterine wall.

masses" on each side. Preoperative diagnosis was a myomatous uterus (probably an intramural myoma) with chronic "inflammatory disease" of the tubes and ovaries.

At operation at the Albany Hospital, March 27, 1912, an enlarged uterus was found adherent to the rectum with adherent moderate sized ovarian cysts. On

Digitized by Google

freeing the latter, "chocolate" fluid escaped. The uterus was freed from the rectum with great difficulty. The appendix, both tubes, ovaries and uterus were removed. The tubes appeared normal, both ovaries had been converted into cysts approximately 4 and 6 cm. in diameter. They were not examined microscopically. The posterior portion of the posterior wall of the uterus was occupied by an "adenomyoma" which apparently was not continuous with the mucosa of the uterine cavity. The "adenomyoma" had "extended through" the uterine wall posteriorly and apparently had actually invaded the anterior wall of the rectum (Fig. 64). In freeing the uterus from the rectum, some of the growth was probably left attached to, or in, the rectal wall. The patient made a satisfactory convalescence and had remained well even though it is doubtful whether all the adenomatous tissue was removed at operation.

CASE 3.—*Perforating hemorrhagic cysts of both ovaries; adherent retroflexed uterus; adenoma of endometrial type invading the posterior wall of the uterus and uniting it with the anterior wall of the rectum.*—Mrs. C. A. D., aged thirty-seven,

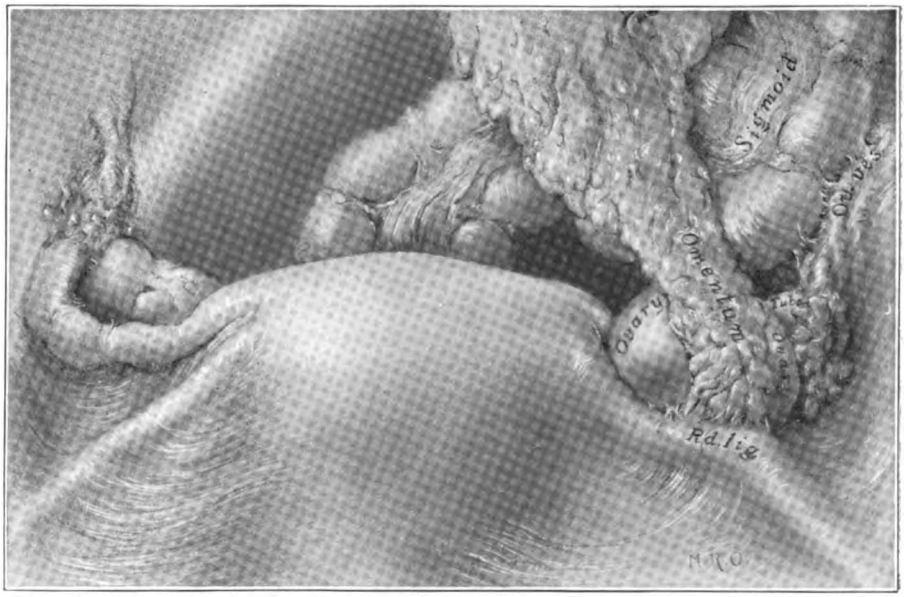


Fig. 47 (Case 23).—Perforating hemorrhagic cyst of the left ovary; adherent retroverted uterus; adenoma of endometrial type of the culdesac invading the posterior wall of the cervix and extending through the vagina and presenting as a hemorrhagic cyst in the vaginal vault. View of pelvic contents from sketch made at the operation (slightly reduced in size). The uterus was retroverted, the ovary drawn up over the left tube and adherent to the round ligament. The tip of the omentum was also adherent to the ovary and the round ligament at this point. The right tube and ovary were apparently normal. On freeing the omentum, "chocolate" fluid escaped from the perforated ovarian cyst, the perforation having been sealed by the omentum and round ligament.

complained of pain of one year's duration in the left side of the lower part of the abdomen. She had been in bed ten days at the onset of the pain. The diagnosis of "peritonitis" was made at that time. She had been married eleven years, had two children, 10 and 8 years of age, and no miscarriages. The menstruation was regular, moderate and normal, the last flow being a week before the operation. Pelvic examination revealed the uterus to be retroflexed, adherent, with probable cystic inflammatory masses on each side. Preoperative diagnosis was an adherent retroflexed uterus with bilateral hydrosalpinx or adherent cystic ovaries.

Digitized by Google

At operation at the Albany Hospital, April 26, 1912, an adherent retroflexed uterus was found with adherent cystic ovaries. On freeing the latter, "chocolate" fluid escaped. The uterus was freed from the rectum with difficulty. The appendix, both tubes and ovaries and the uterus were removed. The tubes appeared normal; each ovary contained a hematoma, the one in the left ovary being the larger (about 3 cm. in diameter). Histologically, the epithelial lining of the cysts was for the most part lacking. When present, it was low, cuboidal, resting on ovarian tissue without any intervening stroma. In a few places in the cyst wall, definite glandlike structures, lined by columnar cells similar to uterine glands, were found. The lower portion of the posterior wall of the uterus and the supravaginal portion of the cervix were invaded by an adenomatous growth of endometrial type. The depth of the invasion was not more than 4 or 5 mm. (Fig. 63). In places, there was a reaction of the tissues of the uterine wall forming a definite nodule, i. e., an "adenomyoma." The patient made a satisfactory convalescence and has remained well.

CASE 4.—*Perforating hemorrhagic cyst of the left ovary; multinodular myomatous uterus; submucous "adenomyoma" of the right uterine cornu; dense adhesions in the culdesac uniting the posterior wall of the uterus to the rectum.*—Miss E. D. W., aged forty, complained of severe dysmenorrhea of four months' duration, especially in the left side, and some pain in the same side for a week after the menses had ceased. The menstruation was regular, moderate, free from pain until the last four months; since then there has been severe pain as noted above. Pelvic examination demonstrated the uterus to be irregularly enlarged and apparently adherent. Preoperative diagnosis was an adherent myomatous uterus.

Operation at the Albany Hospital, Oct. 11, 1917, revealed the uterus to be irregularly enlarged with an adherent ovarian cyst, approximately 6 cm. in diameter on the left side. On freeing the latter, "chocolate" fluid escaped. The uterus was adherent to the rectum. The appendix, both tubes, ovaries and the entire uterus were removed. The tubes appeared normal, the right ovary was cystic, the left was converted into a hemorrhagic cyst. There were multiple leiomyomas in the uterus and an "adenomyoma" in the right uterine cornu (Fig. 15). Sections of the left ovary were not satisfactory and none were made of the posterior uterine wall to determine whether or not adenoma of endometrial type was present. The patient made a satisfactory convalescence and has remained well.

CASE 5.—*Perforating hemorrhagic cyst of the right ovary; adherent retroflexed uterus; tip of the appendix adherent to the cyst.*—Miss G. D., aged twenty-eight, complained of two "attacks of appendicitis," the first one three months ago and the last one a month ago. She was in bed about a week with each attack. The menstruation was apt to be two or three days late and slight in amount; there was slight pain and the last flow was a week before the operation. Pelvic examination showed the uterus to be retroflexed and adherent, with an adherent cystic mass in the right side of the pelvis. The preoperative diagnosis was adherent retroflexed uterus with adherent ovarian cyst.

Operation at the Albany Hospital, Feb. 7, 1918, revealed an adherent retroflexed uterus, with an adherent ovarian cyst on the right side. The appendix dipped into the pelvis and was adherent by its tip (Fig. 11). On freeing the cyst, "chocolate fluid" escaped. The appendix, right tube and ovary were removed and the uterus was suspended. Only one section from the ovarian cyst was made for microscopic diagnosis; this showed a cyst with its wall lined by low and cuboidal

Digitized by Google

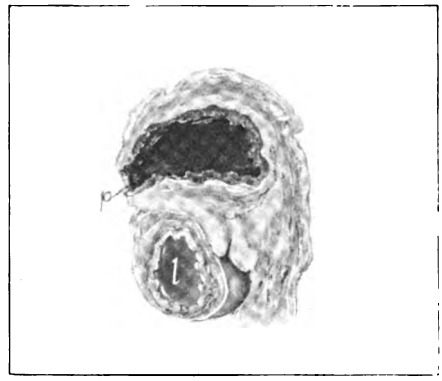


Fig. 48 (Case 23).—Cross section of the ovary shown in Fig. 47 (natural size). The ovarian hematoma is for the most part lined by a single layer of columnar cells with a vascular underlying stroma (Fig. 49). In places where the epithelium is absent, a thick layer filled with pigmented cells is present, evidence of a previous stromal hemorrhage. A corpus luteum (*L*) is situated near the ovarian hematoma as in Fig. 16 (Case 21).

epithelium. No sections were taken from the posterior wall of the uterus to see whether or not adenoma of endometrial type was present.

Case 6.—*Perforating hemorrhagic cyst of the right ovary; adherent retroflexed uterus; "adenomyoma" of posterior uterine wall; gallstones.*—Mrs. J. A. J., aged forty-five, complained of indigestion and attacks of pain in the upper right abdomen. She had been jaundiced four weeks before. There were no definite symptoms referable to the pelvic condition. She was not constipated. She had had one child—

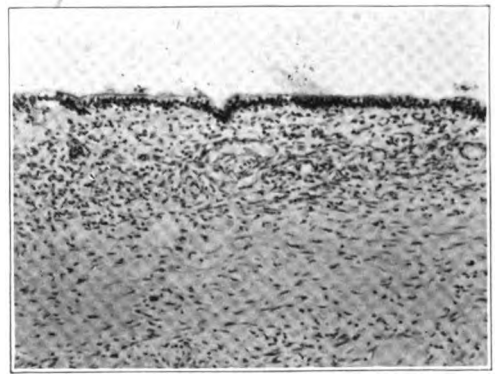


Fig. 49 (Case 23).—Photomicrograph of the wall of the cyst from the portion lined by columnar epithelium with an underlying vascular stroma similar to Fig. 19 (Case 21), and Fig. 39 (Case 15).

13 years old. The menstruation was regular but scanty; there was no pain; the last flow was a week before the operation. The pelvic examination showed the uterus to be enlarged, retroflexed and adherent. The preoperative diagnosis was gallstones and an adherent myomatous uterus.

Operation was performed at the Albany Hospital June 13, 1918. A median incision was made and the gallbladder palpated and gallstones felt. The appendix was then removed. The uterus was enlarged, retroflexed, and densely adherent to the rectum. On freeing the right ovary "chocolate" fluid escaped. Both tubes and ovaries and the entire uterus were removed. An incision was then made over

Digitized by Google

the gall bladder, and it was removed. Both tubes were normal, the left ovary was normal, the right ovary contained a hemorrhagic cyst about 2.5 cm. in diameter. There was a superficial "adenomyoma" of the posterior wall of the uterus which had "united" it to the anterior wall of the rectum. The exact depth of the invasion or the involvement of the uterus wall was not determined. The hemorrhagic cyst was lined by low, cuboidal and columnar epithelium, the columnar predominating. There was a vascular subepithelial stroma, containing evidence of old and recent hemorrhages and an occasional gland, which resembled a uterine gland. The patient made a satisfactory convalescence and has remained well.

CASE 7.—*Perforating hemorrhagic cysts of both ovaries; multiple ovarian hematomas; small leiomyomas of the uterus, adhesions between the posterior uterine wall and the ovaries.*—Mrs. X. W., aged thirty-five, complained of uterine bleeding which had occurred six times in the last twelve weeks. She had never been pregnant; the menstruation was regular, moderate and normal until the last three months. Since then it had been more profuse and frequent and had been accompanied with pain. Pelvic examination showed the uterus to be slightly enlarged, and apparently irregular in consistency, with inflammatory masses on either side. Preoperative diagnosis was a myomatous uterus with bilateral "chronic pelvic peritonitis."

Operation at the Albany Hospital, Nov. 10, 1918, revealed both ovaries to be cystic and adherent to the posterior surface of the uterus. Small myomas were present in the uterus. On freeing the ovaries, "chocolate" fluid escaped. The appendix, both tubes and ovaries and the entire uterus were removed. The tubes appeared normal, both ovaries contained multiple hematomas from 1 to 1.5 to 4 cm. in diameter. Histologically, the hematomas represented various stages in the life cycle of "luteal" hematomas. In one cyst, an adenoma of endometrial type was found. Sections were made from the portion of the posterior uterine wall which was adherent to the ovaries and adenoma of endometrial type was not found. The patient made a satisfactory convalescence and has remained well.

CASE 8.—*Perforating hemorrhagic cyst of the left ovary; multiple leiomyomas of the uterus; dense adhesions between the posterior uterine wall and the rectum.*—Mrs. S. K., aged forty-six, complained of pain in the left side of the lower abdomen for ten years. She had never had any children but possibly had a miscarriage

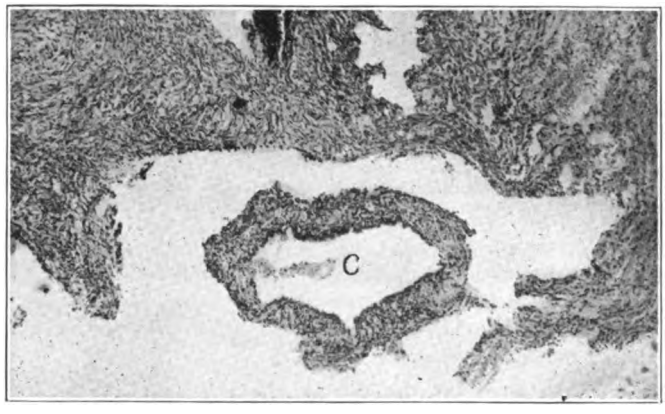


Fig. 50 (Case 23).—Photomicrograph of a small "cyst" partially detached from a pocket in the periphery of the ovary near the site of perforation (lower power than the preceding illustration). This cyst is lined by columnar cells surrounded by a cellular stroma and resembles the "cyst" on the surface of the round ligament (Fig. 70, Case 22). Both are apparently cysts of "endometrial" type.

Digitized by Google

eighteen years ago. The menstruation was regular, without pain; but it had been very profuse for the last year, lasting from five to seven days. The last menstrual flow was two weeks before the operation. Pelvic examination showed the uterus to be irregularly enlarged and apparently fixed in the pelvis. Preoperative diagnosis was a myomatous uterus with pelvic adhesions.

Operation at the Albany Hospital, Jan. 16, 1919, revealed a multinodular myomatous uterus, pushed forward by a densely adherent left sided ovarian cyst about 8 cm. in diameter (Fig. 14). The right tube and ovary were normal. On freeing the ovarian cyst, a large amount of "chocolate" fluid escaped. The adhesions between the uterus and the rectum were very dense, and the two were separated with great difficulty. The appendix, both tubes, ovaries and uterus were removed. Only one section was made from the cyst and that was unsatisfactory. Sections were not made from the posterior portion of the uterine wall to determine whether or not adenoma of endometrial type was present.

CASE 9.—*Perforating hemorrhagic cyst of both ovaries; dense adhesions in the culdesac uniting the anterior rectal wall to the supravaginal portion of the cervix and the lower portion of the uterus; postoperative hernia following the incision and drainage of appendiceal abscess twelve years previously.*—Mrs. C. J. H., aged

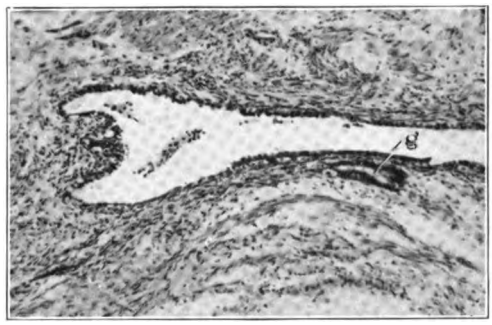


Fig. 51 (Case 23).—Photomicrograph of a peritoneal fold near the perforation of the cyst. This is an adenoma of endometrial type.

twenty-six, complained of pain in the right side. She had been married one and a half years and had not been pregnant. Menstruation was regular, normal, moderate in amount and not painful. The pain in the right side was of nine months' duration; at times it was severe enough to cause the patient to go to bed; she was not constipated. The pelvic examination showed the uterus to be of normal size and pushed forward by a "cystic" tumor extending nearly to the level of the umbilicus. The cyst appeared to be adherent. The preoperative diagnosis was an adherent ovarian cyst, probably a dermoid. On account of the adhesions, malignancy was also considered.

Operation at the Albany Hospital, March 17, 1920, revealed a left ovarian cyst about 9 cm. in diameter, posterior to the uterus and adherent to the posterior surface of the uterus and the anterior wall of the rectum (Figs. 12 and 13). On freeing it, a large amount of "chocolate" fluid escaped. A similar, but smaller, cyst was found in the right ovary. The appendix was removed; the hernia repaired; the left tube and ovary removed; the cyst excised from the right ovary and the uterus freed from the rectum and suspended. The tubes appeared normal. Histologically, the cysts were for the most part lined by epithelium of low to cuboidal type. Evidence of old and recent hemorrhages was found in the cyst wall. Tissue was not removed from the posterior wall of the uterus and the anterior wall of the

Digitized by Google

rectum to determine whether or not adenoma of endometrial type was present. The patient made a satisfactory recovery and has remained well.

Case 10.—*Perforating hemorrhagic cyst of the left ovary, adherent retroflexed uterus; acute appendicitis.*—Miss M. D., aged thirty-four, was admitted to the Albany Hospital, May 8, 1920, with symptoms of acute appendicitis. Menstruation was regular, always profuse and accompanied by severe pain, especially in recent years; she often remained in bed for the first two days of the menstrual period. The last flow was two weeks before the operation. She had had three "attacks of appendicitis" the first one in September, 1919, the second in December, 1919, and the third and present attack began the day before her admission to the hospital. The physical examination revealed tenderness and rigidity over the appendix; the uterus was retroflexed and adherent; the appendages on the left side were enlarged and adherent. The preoperative diagnosis was acute appendicitis,

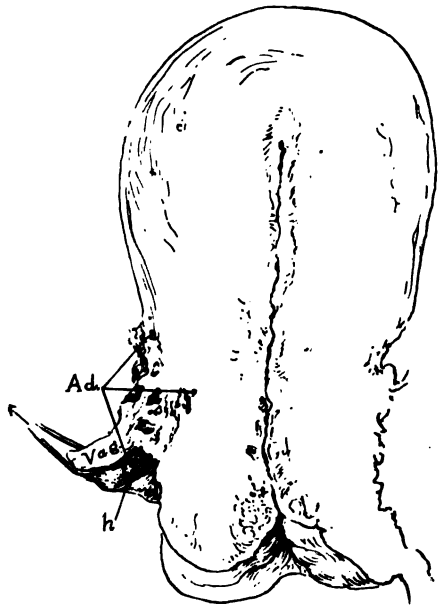


Fig. 52 (Case 23).—Sagittal section of the uterus; × ⅔. This shows the adenoma of endometrial type involving the posterior surface of the supravaginal portion of the cervix, invading the cervix and posterior vaginal wall at the cervicovaginal attachment and presenting in the posterior vault of the vagina as a small hemorrhagic cyst (*h*).

adherent retroflexed uterus, with adherent cystic ovary or hydrosalpinx on the left side.

Operation was performed on the day of admission. Through a medium incision, the left ovary was found enlarged and adherent. On freeing the ovary, "chocolate" fluid escaped. The uterus was freed from the rectum, to which it was adherent, and suspended (Fig. 7). The appendix was also removed. Histologically the hemorrhagic cyst was lined by a single layer of low cuboidal or columnar epithelium, cuboidal predominating; there was in places a thin intervening vascular stroma between the epithelial lining and the ovarian tissue proper. Glandlike spaces lined by a single layer of columnar cells were found scattered through the cyst wall and were most numerous near the site of perforation (Fig. 9). A small "pocket" or cyst was situated lateral to the main cyst (Fig. 8). This pocket was lined by columnar epithelium accompanied by a definite underlying stroma, and in one

Digitized by Google

place, there was a definite "endometrial" formation (Fig. 10). Evidences of old and recent hemorrhages were found in the cyst. Histologically, both cysts suggested that they were adenocystoma of the endometrial type. Tissues were not removed from the raw areas caused by freeing the adhesions to determine whether or not adenoma of endometrial type was situated in this area. The patient made a satisfactory surgical convalescence, but the dysmenorrhea has not been relieved by the operation. I examined the patient in September, 1920, and could detect a definite small area of induration in the culdesac posterior to the cervix, which I believe is due to an adenoma of endometrial type in that situation.

Case 11.—*Perforating hemorrhagic cyst of the right ovary, adherent to the side of the pelvis.*—Mrs. L. H., aged thirty, complained of pain in the right side of the lower abdomen, especially during the menstrual period. The symptoms were of five months' duration. She had been married four years and had never been pregnant. Menstruation was regular, moderate in amount; she always had had some pain but this had been much worse for the last five months. The last flow was just passed. Pelvic examination showed the uterus to be normal in size and drawn slightly to the right side; the appendages on that side were apparently adherent. The preoperative diagnosis was "chronic pelvic inflammatory disease" probably of tubal origin.

Operation at the Albany Hospital, May 10, 1920, revealed the right ovary cystic and adherent to the side of the pelvis (Fig. 1). On freeing it, "chocolate" fluid escaped. The right tube, ovary and the appendix were removed. Histologically, the cyst for the most part lacked an epithelial lining, but when present,

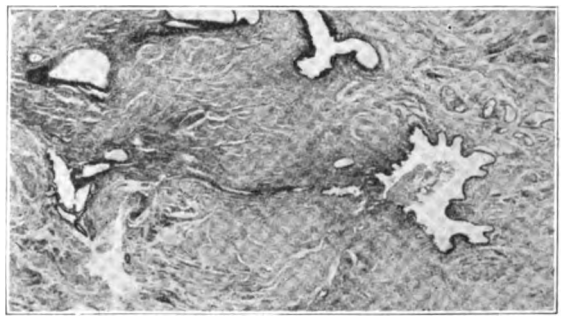


Fig. 53 (Case 23).—Photomicrograph of a portion of the cervix showing the "adenomyoma" with partially collapsed cavities which were filled with "menstrual" blood at the time of the operation.

it consisted of a single layer of cell low to cuboidal in form (Fig. 3). In a few places, there was evidence of either old or recent hemorrhages in the wall of the cyst. Pockets or clefts were found in the ovary about the site of perforation. These pockets were lined by columnar cells with gland formation and a cellular stroma resembling endometrium (Fig. 4). The patient made a satisfactory recovery. I saw her June 16, 1921. She felt better than she did before the operation, but still had some pain in the lower abdomen. On examination, I found the left ovary to be enlarged and adherent to the side of the pelvis and a small area of induration in the culdesac. I believe that she now has a perforating hemorrhagic cyst of the left ovary with adenoma of endometrial type in the culdesac and may later require another operation.

Case 12.—*Perforating hemorrhagic cysts of both ovaries, diffuse adenoma of endometrial type involving the posterior uterine wall, the anterior rectal wall and*

Digitized by Google

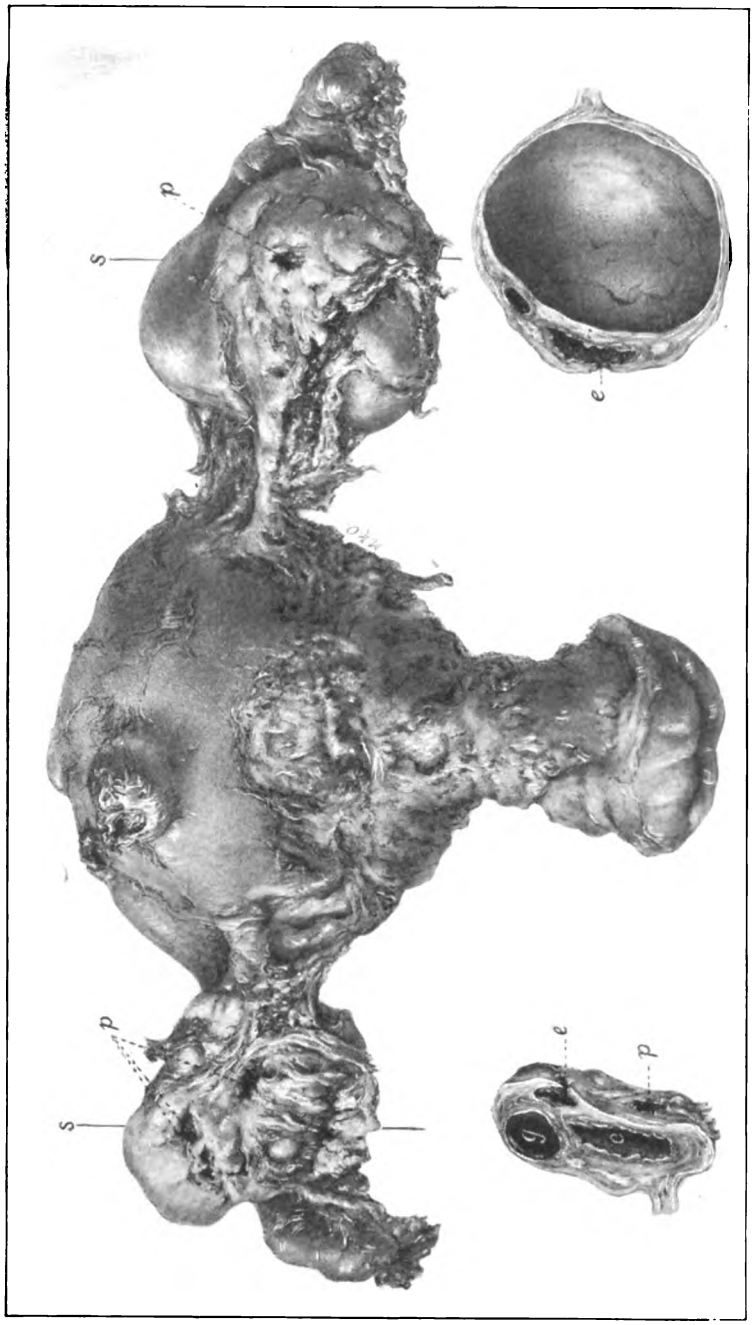


Fig. 54 (Case 19).—Perforating hemorrhagic cysts of both ovaries, adherent retroflexed uterus, small subserous leiomyoma, diffuse adenoma of endometrial type invading the posterior wall of the uterus and also probably the anterior wall of the rectum, adenoma of endometrial type of the sigmoid. Posterior view of the uterus, tubes and ovaries, the latter turned upward showing the perforation (*p*) on the lateral surface of the left ovary and the under surface of the right (natural size). Cross section of the left ovary shows *c*, the hematoma of "endometrial" type (Fig. 57), with perforation at *p*. The small pocket *e* is lined almost entirely with "endometrial" tissue (Fig. 58). The cyst *g* is a graafian follicle hematoma. The cross section of the right ovary shows a small hematoma *e* lined by "endometrial" tissue. The larger cavity is a graafian follicle cyst.

Digitized by Google

extending laterally into both broad ligaments.—Mrs. T. H., aged thirty-six, complained of increasing constipation of six months' duration but no pain or other discomfort. She had one child 6 years old. This was the only pregnancy. The menstruation was normal and moderate; there was no pain. The last flow occurred four days before the operation. Pelvic examination showed the uterus to be slightly enlarged and fixed in the pelvis; there was induration in the culdesac, most marked high up, with distinct bulging into the rectum; this was best detected by rectal palpation. The preoperative diagnosis was dense pelvic adhesions (chronic pelvic peritonitis) with the possibility of implantation of cancer in the culdesac or cancer of the rectum at the junction of the rectum and the sigmoid.

At operation June 8, 1920, both ovaries were enlarged, cystic and adherent. On freeing them, "chocolate" fluid escaped. The uterus was fused to the rectum, with marked induration in both broad ligaments. The diagnosis was evident at the operation, that is, the adhesions and the induration of the broad ligaments were due to an adenoma of endometrial type. The appendix, both tubes and ovaries and the uterus were removed (Fig. 60). The uterus was freed from the rectum

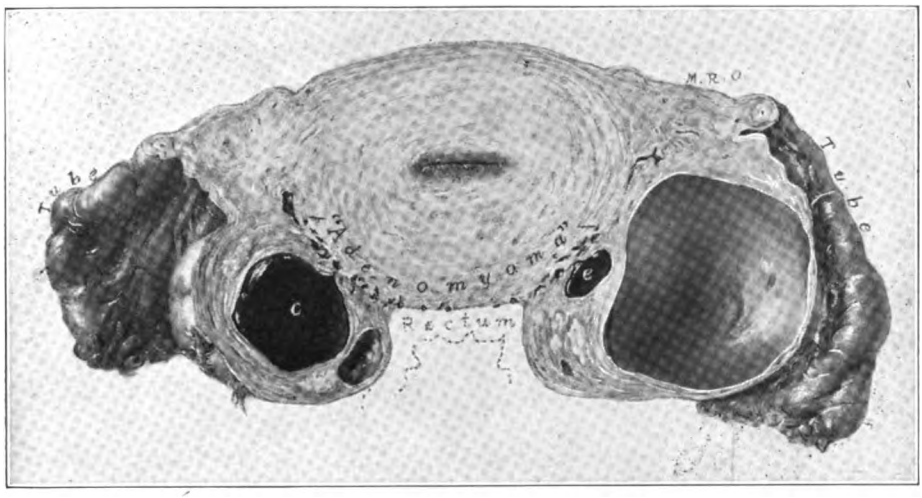


Fig. 55 (Case 19).—Cross section of the uterus and ovaries (natural size) indicating the condition found at operation. Both ovaries were adherent to the posterior surface of the uterus thus sealing the perforations. The adenoma had spread over the surface of the uterus and was just beginning to invade it (Fig. 59). The relation of the rectum to the uterus is indicated by the dotted lines. The larger hematoma, *c*, of the left ovary is shown in longitudinal section, and also the smaller one, *e*, of the right ovary, with the graafian follicle cyst lateral to it. Sections of the uterine wall failed to show any "endometrial" tissue between the superficial growth on its posterior surface and the mucosa of the uterine cavity.

with great difficulty, and at the close of the operation, the rectal wall still felt indurated especially over the area marked *x* in Figure 62. Undoubtedly, adenoma was left behind in the anterior wall of the rectum and in the broad ligament. Histologically the cyst of the right ovary was for the most part lacking in an epithelial lining, when present it was low and cuboidal. Columnar epithelium resembling that of the endometrium was found in clefts and pockets in the surface of the ovary about the site of perforation. Adenoma of endometrial type was found invading the posterior uterine wall and giving rise to a definite "adenomyoma" (Figs. 61 and 62). Sections between the "adenomyoma" and the uterine cavity did not show any connection between the two. The patient made a satisfactory recovery and has remained well. There has not been any evidence of an extension of the growth of the adenoma, undoubtedly left in the pelvis and in the anterior

Digitized by Google

wall of the rectum. The patient was examined May 23, 1921. A slight area of induration, about the size of the end of the examining finger, was palpated in the anterior wall of the rectum. The rectal mucosa was freely movable over it. This area of induration was definitely smaller than at the time of the operation.

Case 13.—*Perforating hemorrhagic cyst of the right ovary; adenoma of endometrial type invading the posterior wall of the cervix, the vagina and the anterior wall of the rectum.*—Miss E. H., aged thirty, complained of severe dysmenorrhea and marked constipation. The menstruation was regular, moderate in amount, always painful, but worse lately. The last flow occurred four weeks before the first operation and the patient was due to menstruate the day of the operation. Pelvic examinaion showed the uterus to be in normal position with a small definite localized area of induration just back of the cervix. The end of the examining finger just about covered the area which could be detected better on rectal palpation. To the right of this area and above could be felt an adherent cystic mass. The preopera-

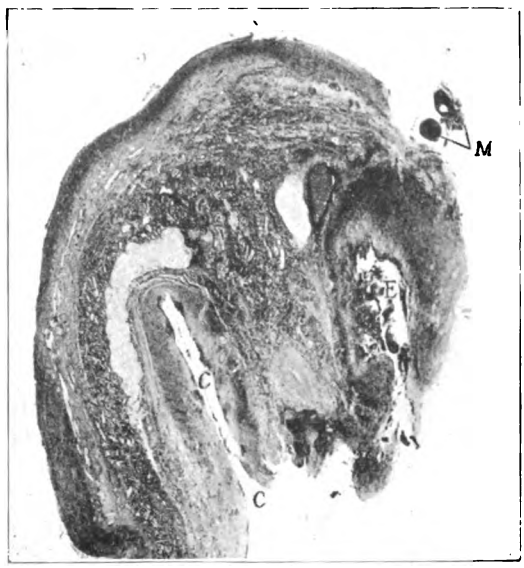


Fig. 56 (Case 19).—Enlargement (× 5) of the upper portion of the left ovary showing the collapsed hemorrhagic cyst *C* (Fig. 57), the endometrial pocket *E* (Fig. 58) and small fragments *M*, loosely attached to the surface of the ovary. These fragments contained "glands" of endometrial type.

tive diagnosis was a probable perforating hemorrhagic cyst of the right ovary with adhesions in the culdesac.

Operation at the Albany Hospital, June 28, 1920, revealed the left tube and ovary apparently normal. The right ovary was prolapsed and adherent to the side of the pelvis. The lower portion of the culdesac was obliterated by adhesions (Fig. 27). As the patient was very anxious for conservative surgery, I removed only the appendix, the right tube and ovary. Histologically the ovarion cyst was lined by a single layer of cuboidal to columnar epithelium with an underlying vascular stroma into which there was marked hemorrhage, i.e., "premenstrual" hematoma. Gland-like structures resembling uterine glands were present in the wall of the cyst near the site of perforation (Fig. 29) and also on the surface of the ovary about this site (Fig. 32). Lateral to the cyst was a pocket lined by columnar cells of endometrial type with stroma and recent hemorrhage (Fig. 30). The patient made a

Digitized by Google

satisfactory convalescence. Pelvic examination made before the patient left the hospital showed the same nodule posterior to the cervix, and I realized that it was probably due to adenoma of endometrial type. I saw her again in November, 1920. She had not improved, if anything the menstrual pain was worse. On examination, I found the pelvic condition about the same as before leaving the hospital except the nodule in the culdesac seemed a little larger. The patient was anxious to avoid another operation and decided to wait. She was seen again in March, 1921, and the history was the same as before. On examination, the induration in the culdesac seemed definitely larger.

A second operation was performed March 21, 1921, three weeks after the last menstrual period. On drawing the uterus forward, the anterior wall of the rectum was carried with it in a very characteristic manner (Fig. 33). The culdesac was obliterated to the level of the uterine origin of the uterosacral ligaments, the anterior wall of the rectum having become fused with the supravaginal portion of the cervix up to this point. The rectum was freed from the posterior wall of the cervix, and the entire uterus and the remaining ovary were removed. The patient made a satisfactory convalescence. Histologically an adenoma of endometrial type was found invading the posterior wall of the cervix and to a lesser degree the vagina and the anterior wall of the rectum (Figs. 34, 35 and 36).

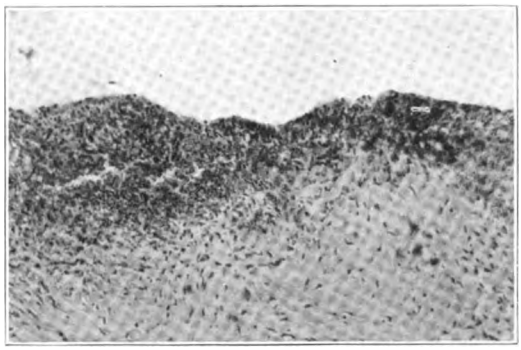


Fig. 57 (Case 19).—Photomicrograph of a portion of the wall of the hematoma *C*. The cyst is lined in part by a single layer of epithelium, cuboidal and columnar (columnar epithelium is present in the center of the illustration). Recent hemorrhage is present in the subepithelial stroma, and to the right, the epithelial lining is lacking. The patient was operated on the "last" day of the menstrual period. Compare with Fig. 29 (Case 13) when the patient was operated on the day that menstruation was due.

Case 14.—*Perforating hemorrhagic cysts of both ovaries, adherent retroflexed uterus.*—Mrs. H. H., aged thirty-one, complained of sterility. She had been married three years and had never been pregnant. The menstruation was occasionally irregular, extending over the usual period, from seven to ten days; it was always profuse; the last menstrual flow was two weeks before the operation. Pelvic examination showed the uterus to be retroflexed and adherent, as were also the appendages on both sides. There was a slight degree of induration in the culdesac. The preoperative diagnosis was an adherent retroflexed uterus and possibly bilateral, perforating hemorrhagic cysts of the ovaries.

At operation at the Albany Hospital, July 6, 1920, the uterus was found to be retroflexed and adherent. Both ovaries were cystic and adherent; in freeing the latter, "chocolate" fluid escaped. The tubes appeared normal. The cysts were excised from the ovaries; the appendix removed and the uterus suspended and also curetted. Histologically the cysts were lined by a single layer of epithelium, low, cuboidal and columnar. In some places the epithelium rested directly on the

Digitized by Google

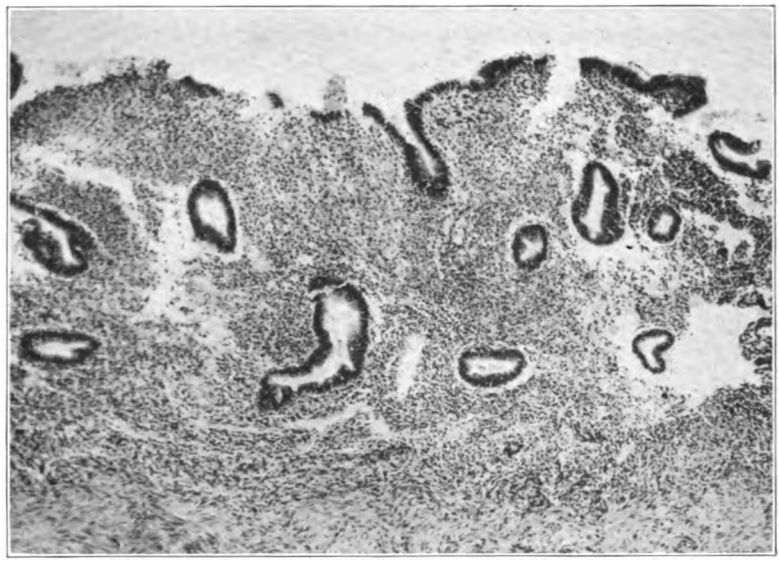


Fig. 58 (Case 19).—Photomicrograph showing the type of tissue lining the "pocket" *e* of the left ovary. One would think it had been removed from the mucosa of the uterine cavity.

ovarian tissue; in other places there was an intervening vascular cellular stroma; glandlike structures were also present and the histologic picture in some areas of the cyst wall resembled endometrial tissue. Subepithelial hematomas were also present. The patient made a satisfactory convalescence.

Case 15.—*Perforating hemorrhagic cyst of the right ovary; adherent retroflexed uterus, with a diffuse adenoma of endometrial type superficially involving the greater portion of the posterior wall of the uterus which was densely adherent to the bottom of the culdesac and rectum; intramural leiomyomas.*—Miss M. D., aged thirty-nine, complained of uterine bleeding and diarrhea of about six months' duration. The menstruation was regular until about six months before the operation. Since that time the patient had been flowing profusely, without any pain, every two weeks, and it often lasted a week. Diarrhea was of the same duration as the increased menstrual flow with watery bowel movements without pain or blood. Pelvic examination showed the uterus to be retroflexed, slightly enlarged, irregular and adherent. The appendages were not palpated on either side. The preoperative diagnosis was an adherent retroflexed myomatous uterus.

At operation at the Albany Hospital, July 12, 1920, the uterus was found retroflexed and densely adherent to the rectum and the bottom of the culdesac (Fig. 42). The left tube and ovary were apparently normal. The right ovary was adherent to the posterior surface of the uterus (Fig. 38). On freeing it, "chocolate" fluid escaped. The appendix, right tube and ovary and the entire uterus were removed. Histologically the ovarian cyst was lined by a single layer of cuboidal to columnar epithelium resting in a cellular vascular stroma (Fig. 39). Recent hemorrhage was present in this stroma. In places, glandlike structures were present which resemble uterine glands. Epithelial tissue was found in the pockets in the surface of the ovary about the site of perforation, which even more closely resembled typical endometrium (Fig. 40). A diffuse adenoma of endometrial type (Fig. 37) had superficially invaded the greater portion of the posterior uterine wall, being present in the area of the uterine wall to which the ovary was adherent at

Digitized by Google

the site of perforation and spreading over the entire area which was adherent to the bottom of the culdesac and the rectum and extending beneath the uterine serosa above this area, forming small blebs.

Histologically the lining of the hemorrhagic cyst, the tissues in the ovarian clefts about the site of perforation and the diffuse growth involving the posterior

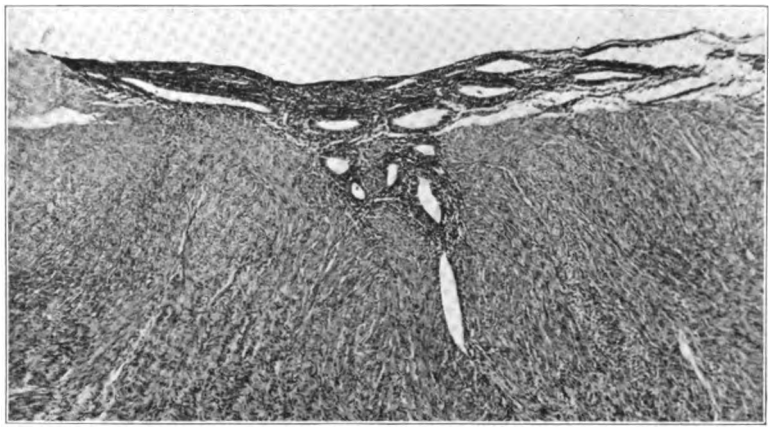


Fig. 59 (Case 19).—Photomicrograph (lower power) of a portion of the posterior wall of the uterus situated just beneath the adherent left ovary. The adenoma resembles a broad headed tack with a short point pushed into (invading) the uterine wall. The tissue lining, the hematoma *c*, the pocket *e* and that shown in this illustration all represent the same process as altered by physical conditions.

surface of the uterus were similar, except that in the ovary it was an adenocystoma of endometrial type with the cystoma feature predominating while in the uterus the adenomatous feature prevailed. The patient made a slow but satisfactory recovery, but died about six months later. The cause of death was not determined.

Case 16.—*Perforating hemorrhagic cyst of the left ovary, retroflexed uterus; slight adhesions about the left ovary; chronic appendicitis.*—Mrs. J. W., aged thirty-one, complained of pain in the right side in repeated attacks during the last ten years. She had one child, 5 years old, and possibly had a miscarriage one and one-half years ago. The menstruation was always profuse and painful. Pelvic examination showed the uterus to be retroflexed but freely movable. The preoperative diagnosis was chronic appendicitis and retroflexed uterus.

At operation at the Albany Hospital Oct. 28, 1920, the appendix which was adherent was removed. The uterus was retroflexed but freely movable. The left ovary was cystic and adherent. On freeing it, "chocolate" fluid escaped. The hematoma was excised from the left ovary, and the uterus suspended and curetted. Histologically, the cyst was lined by a single layer of cuboidal epithelium. Pockets or clefts were found in the ovary about the site of perforation which were lined by columnar epithelium with gland formation resembling endometrium. The patient made a satisfactory recovery and has remained well.

Case 17.—*Perforating hemorrhagic cysts of both ovaries; adherent retroflexed uterus; multiple small leiomyomas; discrete superficial "adenomyomas" in the posterior uterine wall where the left ovary was adherent at the site of its perforation and adenoma beneath the adherent right ovary.*—Mrs. C. A. P., aged thirty-eight, complained of uterine bleeding. She had been married eight years but had never been pregnant. The menstruation was regular, painless and always profuse, but more so lately. There had been irregular "spotting" for the last nine months.

Digitized by Google

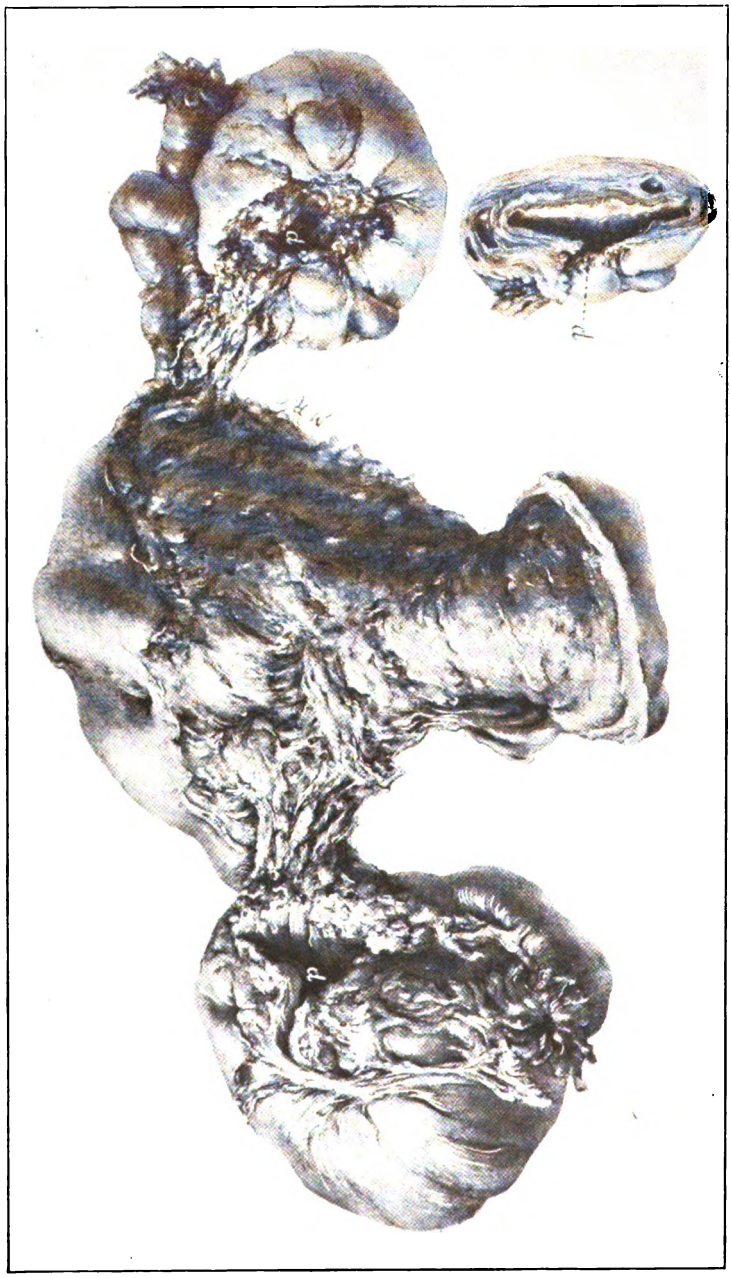


Fig. 60 (Case 12).—Perforating hemorrhagic cysts of both ovaries; adenoma of endometrial type of the posterior uterine wall uniting it to the rectum and extending laterally into both broad ligaments. Posterior view of the uterus, tubes and ovaries (natural size). The uterus was separated from the rectum with great difficulty and purposely some of the uterine tissue was left attached to the anterior wall of the rectum; hence the rough and ragged appearance of the uterus. The left ovary contains a graafian follicle cyst about 6 cm. in diameter, with a smaller perforating hemorrhagic cyst on its lateral surface. The right ovary contains a collapsed hemorrhagic cyst perforating on its under surface. Histologically, the right cyst was the exact counterpart of the condition shown in Figures 3 and 4 (Case 11), namely, a hematoma of probable endometrial type in which recognizable "endometrial" tissue was found only in pockets in the periphery of the ovary about the perforation.

Digitized by Google

Pelvic examination showed the uterus to be retroverted, irregular in outline and apparently adherent. The appendages were not palpated. A slight area of induration could be palpated in the culdesac, apparently in the posterior wall of the uterus. It was detected best on rectal palpation. The preoperative diagnosis was an adherent retroverted uterus with small myomas.

At operation at the Albany Hospital Dec. 7, 1920, the uterus was found to be retroverted and adherent. Both ovaries were cystic and adherent to the posterior surface of the uterus. On freeing the ovaries, "chocolate" fluid escaped. The appendix, both tubes and ovaries and the entire uterus were removed (Fig. 43). The tubes were normal. Histologically both hemorrhagic cysts contained a pigmented wavy "luteal" layer with evidence of "regeneration" of the epithelial lining of the cysts from the periphery of the ovary at the site of perforation. In the clefts in the ovary were areas of epithelial cells resembling endometrium. The area (Fig. 44) of the posterior uterine wall which was adherent to the left ovary showed a dis-

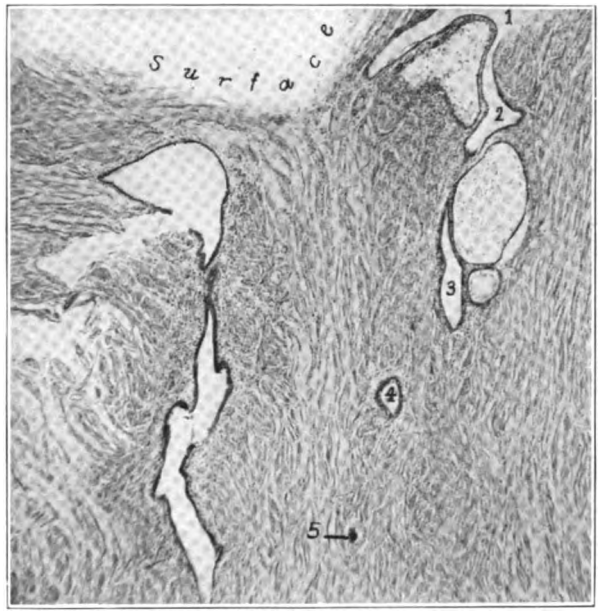


Fig. 61 (Case 12).—Photomicrograph of a portion of the posterior wall of the uterus beneath the attachment of the right ovary. The adenoma has invaded the uterus from the peritoneal surface like a long pointed crooked tack in which the head had probably been torn off during the operation. Compare with Fig. 59 (Case 19).

crete nodule of "adenomyoma" (Fig 46). Adenoma of endometrial type was found beneath the adherent right ovary (Figs. 44 and 45). The patient made a satisfactory convalescence and has remained well.

Case 18.—*Perforating hemorrhagic cyst of the right ovary; multiple small leiomyomas of the uterus; adhesions between the uterus and the rectum with adenoma of endometrial type involving the posterior wall of the uterus and also the posterior surface of the right broad ligament.*—Mrs. H. K., aged thirty-seven complained of marked constipation. She was married but had never been pregnant. The menstruation was regular, moderate and painless. Pelvic examination showed the uterus to be irregularly enlarged and adherent, with an area of marked induration in the culdesac between the uterus and the rectum. This induration was very

Digitized by Google

evident on rectal palpation and had led to a previous diagnosis of possible malignancy by another physician. The appendages on the left side were enlarged and cystic; those on the right were not palpated. The preoperative diagnosis was perforating hemorrhagic cyst of the left ovary with culdesac adhesions and adenoma of the endometrial type.

Operation at the Albany Hospital Dec. 8, 1920, revealed the uterus irregularly enlarged by multiple leiomyomas and the left ovary enlarged with multiple retentive cysts but freely movable. The right ovary was normal in size and adherent to the side of the pelvis. On freeing it, "chocolate" fluid escaped. The tubes appeared normal. The appendix, the left tube and ovary, the right tube, the greater portion of the right ovary and the entire uterus were removed. Microscopically, the cyst

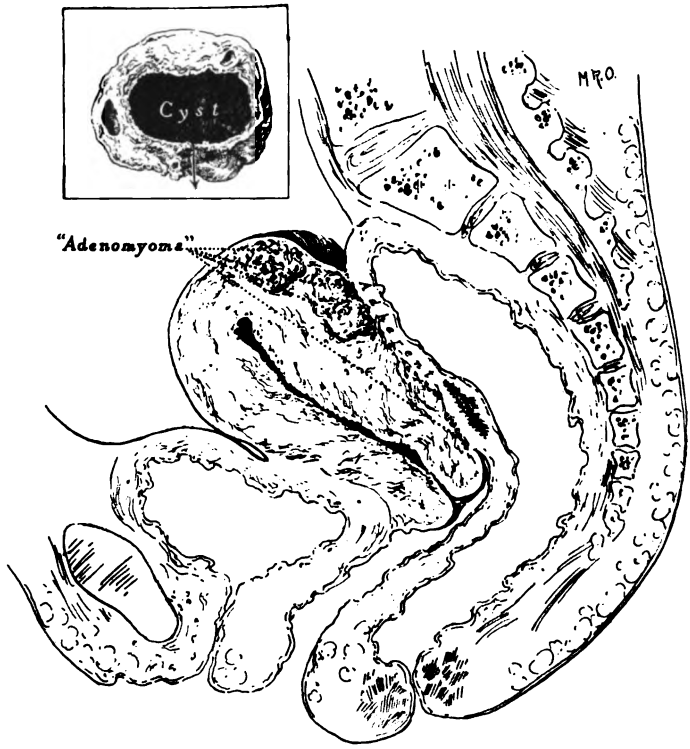


Fig. 62 (Case 12).—Sagittal section of the pelvis showing relation of the "adenomyomatous uterus" to the rectum prior to the operation; × ½. The adenoma arising in the culdesac "due to the escape of the contents of the cyst" has invaded the posterior wall of the uterus forming a definite "adenomyoma" of the fundus and uniting the uterus to the rectum and superficially invading that organ. The area marked *x* indicates a distinct nodule felt in the anterior rectal wall prior to, and also during, the operation. This nodule or thickening was not removed. The rectal mucosa over it was freely movable, and I believe it is a nodule of adenomatous tissue in the rectal wall. It is interesting to await its ultimate fate; so far it has not caused any trouble.

in the right ovary was lined by a single layer of epithelium of low and cuboidal type with a very vascular underlying stroma. In places the cyst wall suggested the remains of a "luteal" layer. Pockets or clefts were found in the ovary about the site of perforation. These pockets were lined by columnar epithelium with gland formation and a stroma resembling endometrium. Similar tissue was also found on the posterior surface of the right broad ligament. Not enough tissue from the uterus was examined to determine the extent of the adenoma involving its

Digitized by Google

posterior surface. Only one section was made from this area; adenoma was found in this section but unfortunately the entire specimen was not saved for further sections. The patient made a satisfactory convalescence except for a slight infection of the lower end of the abdominal incision. The end-result of saving ovarian tissue in this case will be watched with interest.

Case 19.—*Perforating hemorrhagic cysts of both ovaries; diffuse adenoma of endometrial type involving the posterior wall of the uterus, the anterior wall of the rectum, both broad ligaments and forming two separate nodules in the sigmoid (''adenomyoma'' of the sigmoid).*—Mrs. J. W., aged forty-five, complained of marked constipation with attacks of obstruction beginning two years before the operation and gradually increased in severity. She had two children, the youngest 6 years old. The menstruation was regular, moderate and without pain until the last two years. During this time pain had been present, increasing in severity, and the flow had been decreasing in amount. The patient was operated on the last day of the flow. It is of great interest to note that the attacks of the most marked constipation occurred with the menstrual period. These had been especially bad

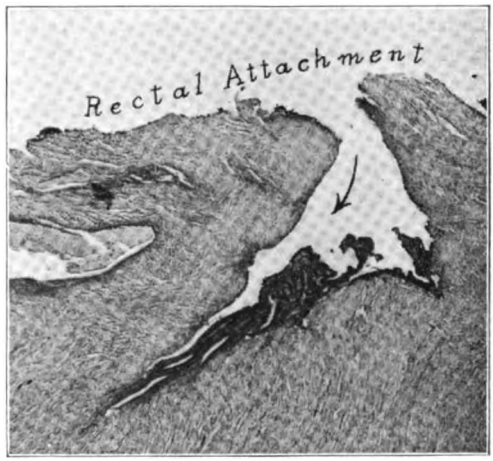


Fig. 63 (Case 3).—Photomicrograph of a section of the posterior wall of the uterus showing the ragged surface caused by freeing the uterus from its attachment to the rectum and also the apparent invasion of the uterine wall from its peritoneal surface (i. e., from "without") by adenoma of endometrial type. Perforating hemorrhagic cysts were present in both ovaries.

during the last year. The pain was so severe the patient had to remain in bed; the abdomen often became distended, and sometimes there were nausea and vomiting. Bowel movements were obtained only with the greatest difficulty. No blood was ever observed in the evacuations. The abdomen remained tender for about a week after the cessation of the flow. Pelvic examination showed the uterus to be irregular, adherent and retroverted. The appendages were not palpated. Rectal palpation confirmed these findings. No localized induration was detected in the culde-sac. Roentgenograms following a barium enema were made but no definite point of obstruction was found. The preoperative diagnosis was an adherent myomatous uterus with possibly a malignant growth of the sigmoid. The true condition was not considered.

At operation at the Albany Hospital Feb. 17, 1921, the uterus, containing small leiomyomas, was found retroverted and adherent to the rectum. A small amount of ''old blood'' was found free in the pelvis. Both ovaries were cystic, enlarged and adherent to the posterior surface of the uterus. On freeing the ovaries, ''choc-

Digitized by Google

olate'' fluid escaped. Two definite puckered areas were found in the sigmoid. One area was situated just above the apparent rectosigmoidal junction and the other about 8 cm. above this one. The upper area was not involved in or continuous with the adhesions uniting the uterus to the sigmoid or those between the ovaries and the uterus. On palpating each of these puckered areas, a definite nodule could be distinctly felt, apparently projecting into the lumen of the sigmoid. The upper one was the larger. The correct diagnosis was now apparent. The appendix was first removed, then both tubes and ovaries and the entire uterus (Figs. 54 and 55). The separation of the uterus from the rectum was extremely difficult for apparently the growth had invaded it and also the broad ligament on both sides. The upper and larger nodule in the sigmoid was excised and an end-to-end suture of the intestine made. Histologically the larger cyst of the left ovary was in part lined by a single layer of epithelium, the cuboidal type predominating, with evidence of recent hemorrhage into the underlying stroma (Fig. 57). Adenoma of endometrial type was found lining the smaller cyst or pocket (Fig. 58) and also on the surface of the ovary, between it and the uterus. The larger cyst of the right ovary was a graafian follicle cyst, but the smaller hemorrhagic cyst or pocket was lined by an adenoma of normal endometrial type; adenoma of endometrial type was found on the surface of the uterus superficially invading its posterior wall (Fig. 59). A similar adenoma was found invading the wall of the sigmoid on its peritoneal surface, extending through the entire wall into the submucosa. The patient made a satisfactory convalescence and has remained well. The end-result is awaited with great interest to determine the fate of the adenoma, undoubtedly still present in the sigmoid and the culdesac.

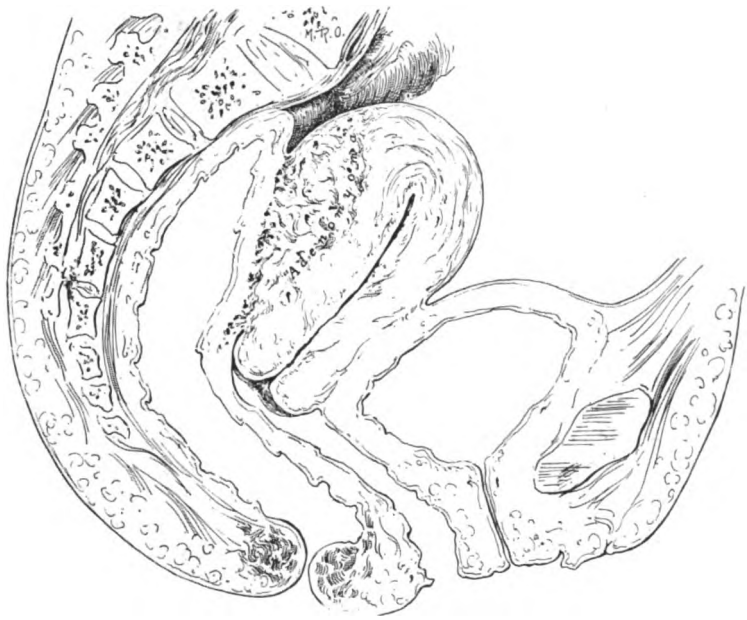


Fig. 64 (Case 2).—Perforating hemorrhagic cysts of both ovaries, diffuse "adenomyoma" of the posterior uterine wall which is fused with the anterior wall of the rectum. Sagittal section of the pelvis; × ½. The "adenomyoma" is apparently not connected with the mucosa of the uterine cavity. I believe this case represents an advanced stage of the conditions shown in the previous illustrations, namely, an "adenomyoma" of the uterus due to the invasion of the uterine wall by adenoma of endometrial type from the culdesac secondary to the escape of the contents of the hemorrhagic cysts into the pelvis.

Digitized by Google

Case 20.—*Perforating hemorrhagic cyst of the right ovary; multiple pelvic adenoma of endometrial type; cancer of the uterine cervix.*—Miss A. N., aged forty-one, complained of irregular uterine bleeding of three months' duration. The menstruation had been regular, moderate and painless. On account of the irregular uterine bleeding during the last three months, it was impossible to determine recent menstrual dates. There were no symptoms referable to the pelvic adenomas. Pelvic examination showed a friable everting growth occupying the vaginal portion of the cervix, especially the posterior lip. The uterus was freely movable, a definite nodule could be detected posterior to the cervix; this was more evident on the left side and best felt on rectal palpation. The preoperative diagnosis was everting

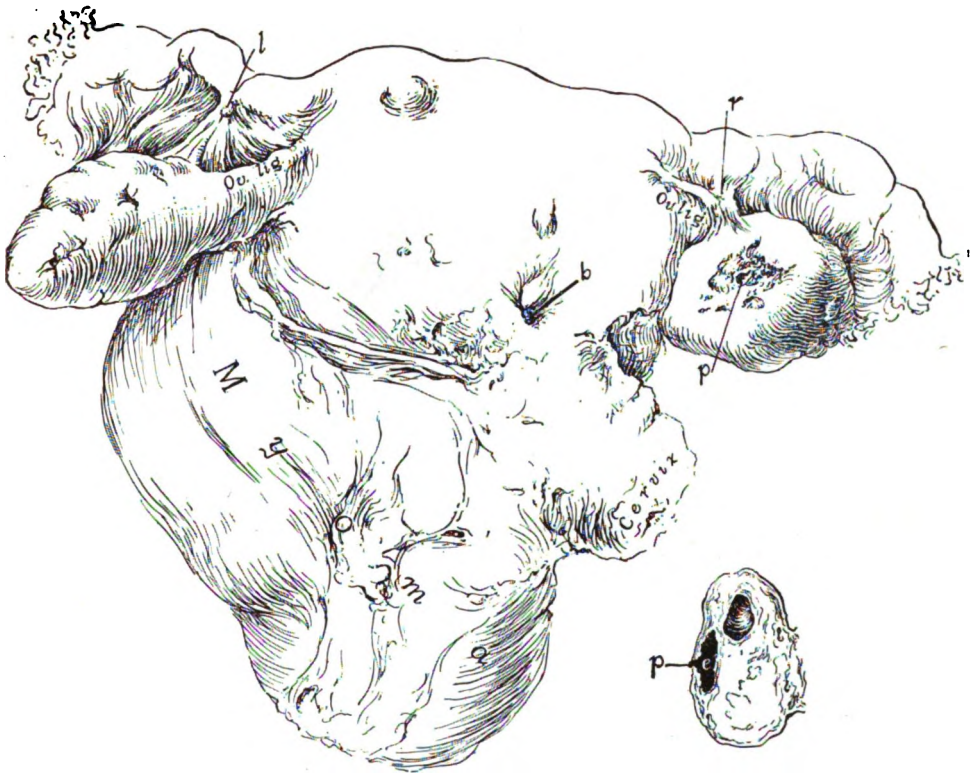


Fig. 65 (Case 22).—Perforating hemorrhagic cyst of the right ovary; multinodular myomatous uterus, deposits of adenoma (endometrial type) on the posterior and anterior surface of both broad ligaments and in the culdesac (the latter deposit not removed), multiple peritoneal blebs (adenomatous) on the anterior and posterior surfaces of the uterus and left broad ligament and in the vesico-uterine fold. Posterior surface of the uterus; × ⅔. The perforation *p* on the under surface of the right ovary is shown with raw area about it caused by freeing it from the posterior surface of the uterus to which it was adherent at *b*. The ovary is also shown in cross section. A hemorrhagic bleb with puckering of the tissue about it (excised for microscopic examination, but unfortunately lost) is indicated at *b*. A puckering of the right broad ligament between the tube and the ovarian ligament is shown—adenoma of endometrial type was found in this tissue (Fig. 67). A similar puckering is shown of the left broad ligament just beneath the tube, adenoma of endometrial type was also present here.

type of cancer of the uterine cervix with possible extension posteriorly on the left side.

At operation at the Albany Hospital March 1, 1921, the uterus was found to be freely movable, the right ovary was cystic and adherent to the posterior surface of the uterus. On freeing it, "chocolate" fluid escaped. The lower portion of the

Digitized by Google

ureters and the bladder was freed, and the entire uterus was removed with a wide excision of the parametrium. The lymph nodes about the iliac vessels were also removed. Histologically, the cancer proved to be of the squamous cell variety; the lymph nodes removed did not show cancer. The right ovary contained a hematoma partly lined by the remains of a wavy pigmented layer and with an epithelial lining of the portion of the cyst wall not occupied by the pigmented layer. Adenoma of endometrial type was also found in the periphery of the ovary about the site of perforation. Secondary adenoma of endometrial type was present in the culdesac just mesial to the left uterosacral ligament (Figs. 71, 72 and 74), in the surface of the posterior uterine wall where it was adherent to the ovary, and on the anterior surface of the uterus in the vesico-uterine fold of peritoneum, just beneath the left round ligament and also to the right of the median line (Fig. 73). The left ovary showed on its under surface a cleft lined by "endometrial" tissue. The patient made a satisfactory convalescence.

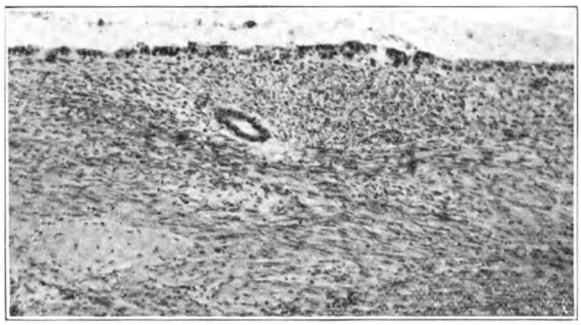


Fig. 66 (Case 22).—Photomicrograph of the wall of the ovarian hematoma showing that it is lined by a single layer of columnar cells with an underlying cellular stroma containing a "gland." It is a hematoma of "endometrial" type and the escape of its contents was the probable cause of the many adenomas of endometrial type found in the adhesions between the folds of peritoneum about the uterus and in the culdesac and also of some, and possibly all, of the peritoneal "blebs" on the surface of the uterus and its ligaments.

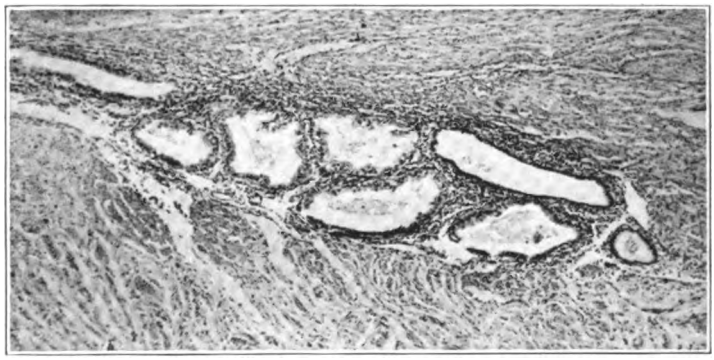


Fig. 67 (Case 22).—Photomicrograph of the puckered right broad ligament shown in Fig. 65. Adenoma of endometrial type has developed between the adherent folds of the ligament.

Case 21.—*Perforating hemorrhagic cyst of the right ovary; adherent retroflexed uterus with diffuse adenoma of endometrial type involving the posterior surface of the uterus and the anterior wall of the rectum.*—Mrs. T. E., aged forty-four, complained of marked constipation, much worse at the menstrual period, especially the last year. She also had indigestion. She had been married six years and had

Digitized by Google

never been pregnant. Menstruation was regular, moderate in amount, occasionally accompanied with slight pain. The constipation was much worse at that time. The last flow occurred two weeks before the operation. Pelvic examination showed the uterus to be retroflexed and adherent, with a distinct area of induration back and above the cervix between the uterus and the rectum. The appendages were not palpated. Preoperative diagnosis was adherent retroflexed uterus, possible perforating hemorrhagic ovarian cyst with adenoma of the culdesac.

Operation was performed at the Albany Hospital March 21, 1921. A median incision was made; the gall bladder was palpated and a stone was felt. The uterus was retroflexed and adherent to the rectum. On drawing the uterus forward, the anterior rectal wall was carried with it. The right ovary was adherent to the side of the pelvis, directly over the course of the right ureter. On freeing the ovary, "chocolate" fluid escaped. The left ovary seemed normal. Both tubes appeared normal. The appendix, right tube and ovary and the entire uterus were removed

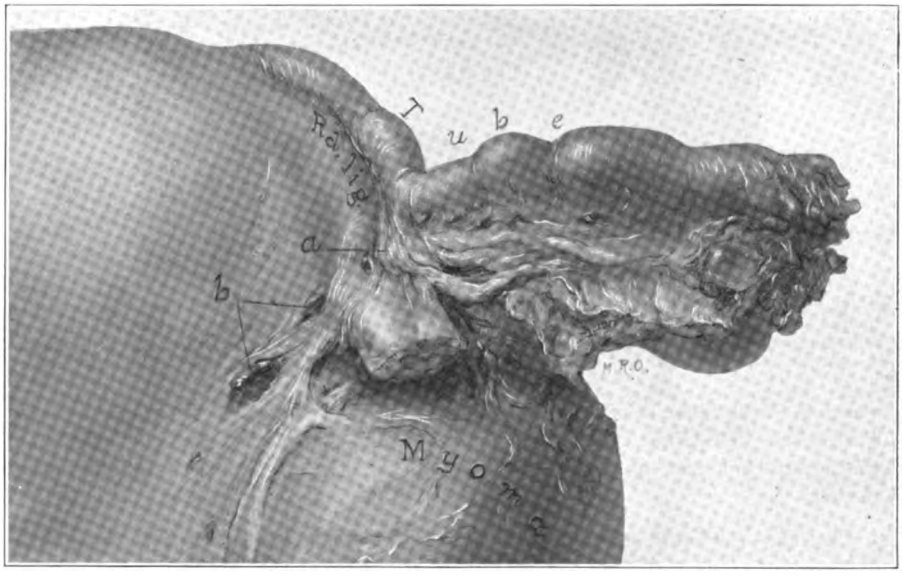


Fig. 68 (Case 22).—"Adenomyoma" of left round ligament with adhesions of the anterior layer of the broad ligament to it, multiple hemorrhagic peritoneal "blebs" (adenomatous). Anterior surface of the left uterine cornu, left tube and round ligament. The anterior surface of the broad ligament is puckered, drawn down and adherent to the round ligament (Fig. 69). The "blebs," many hemorrhagic, with puckering of the tissue about them are similar to the one shown in Fig. 70.

(Fig. 16). The gallstone was removed and the gall bladder drained. The left tube and ovary were not removed because the patient was exceedingly nervous, and the ovary appeared normal. I am awaiting the end-results in this case with interest to see whether or not such ovarian conservatism is justifiable. I fully realized at the time that these cysts are often bilateral and that later she may have a similar condition in the left ovary with secondary growths in the pelvis, or the retention of the ovary may stimulate adenomatous deposits which may have been left in the pelvis at the operation. Histologically the deeper portion of the ovarian cyst was lined by the remains of a pigmented "luteal" layer without an epithelial covering (Fig. 17). The portion of the cyst not occupied by the "luteal" layer was lined by a single layer of columnar epithelium with an underlying vascular stroma (Fig. 19). In the edges of the perforation and in the periphery of the ovary about the

Digitized by Google

site of perforation were deposits of glandular tissue with cellular stroma closely resembling endometrium (Fig. 18). The histologic study of the entire ovary suggested that either the initial rupture of the cyst had been followed by its invasion by epithelium of endometrial type from the periphery of the ovary or else it represents the regeneration of the epithelial lining of an "endometrial" cyst after a hemorrhage. This epithelium extended through the perforation and was relining the cyst. At the same time the "luteal" layer was retrogressing (Fig. 20) and eventually the cyst might be converted into a cyst lined entirely by epithelium of the endometrial type. Adenoma of endometrial type was found in the tissue of the side of the pelvis which was adherent to the ovary at the site of rupture, also in

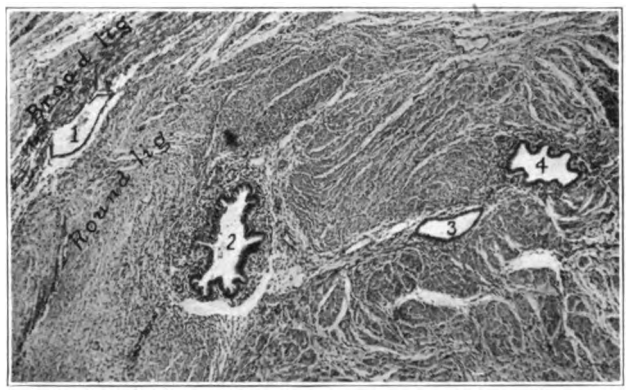


Fig. 69 (Case 22).—Photomicrograph of the left round ligament and the adherent broad ligament shown in Fig. 68. Adenoma of endometrial type has developed in the peritoneal fold between the two ligaments 1, and has invaded the round ligament causing an "adenomyoma" of that structure.

a nodule in the vesico-uterine fold of peritoneum and over a large area of the posterior uterine wall (Figs. 21, 22, 23, 24 and 25) and the anterior wall of the rectum which were adherent to each other (Fig. 26). The patient made a satisfactory recovery.

Case 22.—*Perforating hemorrhagic cyst of the right ovary; multiple leiomyomas of the uterus; multiple small adenomas of endometrial type on the posterior and anterior surfaces of the broad ligaments.*—Mrs. A. D., aged forty-one, complained of pain in the left side, dysmenorrhea and constipation. She had had two children, 13 and 10 years of age. Menstruation was regular, moderate in amount and painless until three years ago. Pain had been present for three years, gradually increasing in severity so that she remained in bed for the first day of the flow. The last flow was three weeks before the operation. Pelvic examination showed an irregular, enlarged uterus with the largest nodule low in the pelvis and to the left side of the cervix. Movements of the uterus were restricted. Preoperative diagnosis was an adherent multinodular myomatous uterus.

Operation at the Albany Hospital April 7, 1921, under nitrous oxid and oxygen anesthesia (patient was a diabetic), revealed a multinodular myomatous uterus, with the largest nodule about 9 cm. in its greatest diameter, extending between the layers of the left broad ligaments. The right ovary was found adherent to the posterior surface of the uterus, and in freeing it, a small amount of "chocolate" fluid escaped. A small nodule with puckering of the surrounding tissue was found on the posterior surface of both broad ligaments between the ovaries and the tube, a similar nodule was also present in the culdesac (not removed). A small hemor-

Digitized by Google

rhagic bleb, about 6 mm. in diameter with puckering of the tissues about it, was found on the part of the posterior surface of the uterus which had been adherent to the right ovary at its site of perforation. Similar blebs were found on the anterior surface of the left broad ligament and about the round ligament. The left broad ligament was puckered and adherent to the round ligament drawing the tube down toward it (Fig. 68). The tubes, ovaries, uterus and nearly the entire cervix were removed (appendix removed at a previous operation). Histologically, the cyst of the right ovary was lined by columnar cells with a vascular stroma and in places gland formation. The histologic structure of this cyst was that of a cystoma of the endometrial type (Fig. 66). The nodules in the broad ligaments showed ade-

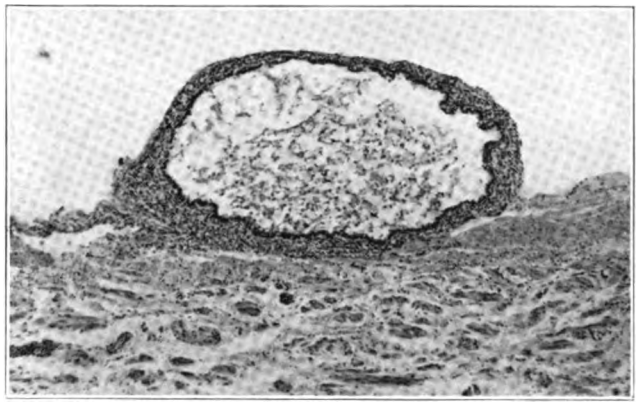


Fig. 70 (Case 22).—Photomicrograph (lower power than preceding) of one of the smaller peritoneal blebs or cysts shown in Fig. 68. It is lined by columnar cells resting on a cellular stroma. Histologically, it is an "endometrial" cyst and similar to the cyst partially detached from the ovary shown in Fig. 49 (Case 23). The other peritoneal cysts indicated in Fig. 68 were examined microscopically and showed a similar condition. If these blebs are of endometrial type and are derived from the contents of the ovary, what is their development? Three possible explanations suggest themselves: first, from the deposit of epithelial cells from the ovary on the peritoneum and their subsequent development into a cyst as shown in Fig. 22 (Case 21); second, a small cyst or dilated gland may have been detached from the ovary as shown in Figs. 32 and 56 (*M*), and may be implanted on the peritoneum and then increase in size, and third, the "specific" irritation of the contents of the ovary caused a metaplasia of the peritoneal endothelium giving rise to a cyst of endometrial type.

noma of endometrial type (Fig. 67), the one on the anterior surface of the left broad ligament had invaded the round ligament forming an "adenomyoma" (Fig. 69). The blebs were interesting in that they were lined by low, cuboidal and columnar epithelium with a vascular underlying stroma (Fig. 70). The supporters of the serosal origin of adenomyoma would probably interpret them as the development of adenomyoma from metaplasia of the peritoneal "endothelium." For further description of the findings in this case see the illustrations with their legends. The patient made a satisfactory recovery.

Case 23.—*Perforating hemorrhagic cyst of the left ovary; adherent retroflexed uterus with adenoma of endometrial type involving the posterior surface of the cervix, uniting the latter to the bottom of the culdesac and the rectum and extending through the vaginal wall and presenting as a hemorrhagic cyst in the vaginal vault behind the cervix.*—Mrs. G. H., aged forty-seven, complained of bearing down sensations. She had had four children, the youngest 10 years of age. Menstruation was regular, moderate in amount and painless. The last flow occurred two weeks before the operation. She was not constipated. Pelvic examination showed a weakened pelvic floor, uterus retroflexed and adherent, with a small nodule in the posterior vaginal vault just back of the cervix, and to the left of the median line. A

Digitized by Google

definite nodular induration was felt in the bottom of the culdesac between the cervix and the rectum. The appendages on the right side felt normal, while the left appendages seemed enlarged and adherent. The preoperative diagnosis was an adherent retroflexed uterus, perforating hemorrhagic cyst of the left ovary and adenoma of endometrial type in the bottom of the culdesac and extending through the vaginal vault.

At operation at the Albany Hospital April 18, 1921, the uterus was found to be retroflexed and adherent. The omentum was adherent to the left ovary and the left round ligament. The left ovary was cystic, drawn up over the left tube and adherent at the point of rupture to the left round ligament and omentum (Fig. 47). The right tube and ovary were freely movable. On drawing the uterus forward, the anterior wall of the rectum, which was adherent to the supravaginal portion of the

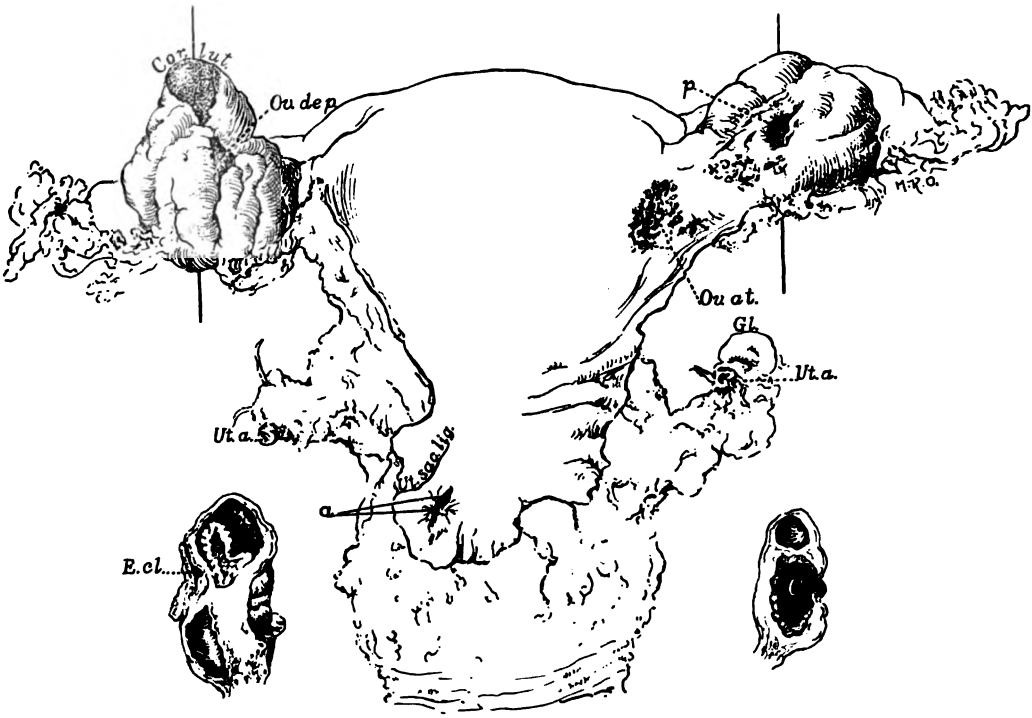


Fig. 71 (Case 20).—Perforating hemorrhagic cyst of the right ovary; adenoma of endometrial type near the left uterosacral ligament below the left round ligament and in the vesico-uterine fold; cancer of the uterine cervix. Posterior surface of the uterus, tubes and ovaries; × ⅔. The right ovary was adherent to the posterior surface of the uterus at *Ov.* Its perforation (*p*) is situated on the lateral surface. On the lateral surface of the left ovary is a small pigmented area *ov. dep.* beneath which is a space lined by columnar epithelium. *Gl.* represents a parametrial lymph node. Just mesial to the left uterosacral ligament is an indurated area with puckering of the peritoneum about it. Small pigmented cysts can be seen in this tissue (Figs. 72 and 74). Histologically, portions of the right ovarian hematoma, the epithelial cleft in the left ovary and the nodules near the left uterosacral ligament, left round ligament and in the vesico-uterine fold are similar, namely, adenocystomas of endometrial type, apparently primary in the ovaries with secondary deposits in the other places.

cervix, was carried with it in a characteristic manner. On freeing the omentum and left ovary, "chocolate" fluid escaped (Fig. 48). The appendix, both tubes and ovaries and the entire uterus were removed, and the pelvic floor was repaired. Histologically, the ovarian cyst was in part lined by cuboidal and columnar epithelium, columnar predominating with a vascular underlying stroma (Fig. 49) and evidence of old and recent hemorrhages. In other places, there was a wavy mem-

Digitized by Google

brane filled with pigmented cells lining the cavity and without an epithelial covering, the probable results of hemorrhage into the wall of the cyst. Sections through the posterior wall of the cervix and the vagina showed that these structures were invaded by an adenoma of endometrial type (Fig. 53), which at the time of operation was found filled with old blood forming small cavities. Adenoma of the endometrial type was also found in a fold of the peritoneum about the left round liga-

Fig. 72 (Case 20).—Indurated area mesial to left uterosacral ligament containing small cysts (Fig. 73). Note the puckering of the peritoneum about this area, see Fig. 74. (I have not yet been able to demonstrate the development of this type of lesion as I have that shown in Fig. 24.)

ment where the perforating cyst had been sealed (Fig. 51). Histologically, the process in the ovary, the fold of the peritoneum about the round ligament, the posterior wall of the supravaginal portion of the cervix and the posterior vaginal wall are the same, namely, an adenoma of endometrial type. The patient made a satisfactory recovery.

CONCLUSIONS

Perforating hemorrhagic cysts of the ovary occur most frequently in women between 30 years of age and the menopause. In the twenty-three cases reported in this paper, only two were under 30 and the oldest patient was 47. It is quite a common condition, probably occurring in nearly 10 per cent of the women of these age limits who require abdominal operations for the relief of pelvic disease. During the year, May 1, 1920, to May 1, 1921, I found perforating hemorrhagic cysts of the ovary in fourteen of 178 patients between 30 and 50 years of age who had an abdominal operation for some disease of the pelvic organs.

The cysts are usually small, between 2 and 4 cm. in diameter, occasionally less than 2 and also occasionally larger than 4 cm. They are quite frequently bilateral, as in eight of the twenty-three cases.

At operation the cyst or ovary is found to be adherent, and in freeing it the "chocolate" contents escape because a previous perforation, which had been sealed by whatever structure the ovary had become adherent to, is reopened or the cyst is torn. Adhesions, due to the "irritating" action of the material which had previously escaped from the ovary, are always present, and these vary greatly in location, density and extent. They may be found in any of the natural pockets

Digitized by Google

and folds of the pelvis where such material would be apt to lodge, and especially in the culdesac. When slight, they simulate the adhesions resulting from pelvic peritonitis of tubal origin; on the other hand, the adhesions in the culdesac may be accompanied by such a marked reaction as to resemble malignancy.

The histologic findings in these cysts vary in different specimens and in different portions of the same cyst. With my present knowledge of their life history, I prefer to state "possibilities" rather than make definite statements which later may prove to be incorrect. There may be several varieties of these cysts; but I am more inclined to believe that most of the apparently different kinds represent various stages in the development and retrogression of one type of cyst and the various phases in its "menstrual" cycle. The initial perforation may have been the rupture of an "endometrial," graafian follicle or atretic follicle hematoma; or following ovulation, an abnormal corpus luteum may have developed due to the invasion of "endometrial tissue" present at the site of rupture. One group of these perforating hemorrhagic cysts shows these conditions: A portion of the hematoma, usually the deeper, is lined by a "luteal" membrane the exact origin of which in some specimens is difficult to state. The rest of the cyst, usually toward the perforation, is apparently being relined by the invasion of epithelium, through the perforation, from epithelium situated in the periphery of the ovary at the site of rupture. This epithelial relining or regeneration is of endometrial type, both in structure and in function. With the advance of the epithelial invasion, the "luteal" membrane retrogresses, and eventually the entire cyst may be relined by this epithelial tissue. This group represents either the development of an "endometrial" cyst from the invasion of a follicular hematoma by misplaced "endometrial" epithelium or else it represents the regeneration of an "endometrial" cyst after a hemorrhage ("menstrual"). Another group apparently represents either an earlier or a later stage of the former. The cysts in this group are entirely lined with epithelium, low, cuboidal or columnar; all three types of epithelium are often present in the same cyst. Usually there is a vascular cellular stroma not unlike that of the endometrium, between the epithelium and the ovarian tissue, often with evidence of old and recent hemorrhage. This stroma varies greatly in thickness and in some instances may be very thin or lacking. Structures, like uterine glands, may be present in this stroma, and these are usually most numerous near the site of the perforation. The entire cyst is like the epithelial portion of the cysts described in the first group, and all gradations between the two groups may be found.

The exact counterpart of the epithelial lining of these ovarian hematomas may be found in the uterine hematomas often occurring in

Digitized by Google

"adenomyoma" of the uterus and apparently due to the retention of menstrual blood. Tissue of endometrial type is also present in pockets in the periphery of the ovary about the perforation, and the tissue in these pockets may resemble normal endometrium more closely

Fig. 73 (Case 20).—Adenoma of endometrial type in the vesico-uterine fold just below the left round ligament. Sagittal section of the uterus; × ⅔. *A* indicates the situation of a small pigmented nodule with puckering of the peritoneum about it. A similar nodule was present in the vesico-uterine fold to the right of the midline corresponding to *X* in the illustration. Histologically, these nodules were similar to the one near the left uterosacral ligament (Fig. 74).

Fig. 74 (Case 20).—Enlargement (× 10) of a stained section of the induration area mesial to the left uterosacral ligament (Figs. 71 and 72). Cystlike cavities are present which are lined by tissue of endometrial type and with evidence of former hemorrhage as shown by pigmented cells in their walls.

Digitized by Google

than that lining the hematoma in the same ovary. The histologic study of these hematomas shows that periodic hemorrhage similar to that of menstruation occurs. I have come to the conclusion that these ovarian hematomas are of endometrial type just as are the uterine hematomas found in "adenomyoma" of the uterus.

I have never found these cysts in women after the menopause and some of those which I have studied were small and apparently retrogressing rapidly. In two instances in which I found adhesions with adenoma of endometrial type in the pelvis, but no gross evidence of these cysts in the ovaries, pockets were found in the periphery of the ovaries lined by columnar cells and a cellular stroma resembling endometrial tissue. I interpreted these pockets as the possible remains of a perforating hemorrhagic cyst in which nearly complete retrogression had occurred. For these reasons I have concluded that their life may sometimes be of short duration, and the "characteristic" adhesions resulting from them may persist long after the cyst has disappeared.

The adhesions form equally as interesting a pathologic study as the cysts themselves because adenoma of endometrial type is present in the tissues involved by the adhesions in a large percentage of the cases. I have studied histologically the tissues involved by the adhesions outside the ovary in fourteen of the twenty-three specimens, and adenoma of endometrial type was found in thirteen of these.

Some time, or possibly many times, in the life of these hematomas, material, including epithelial tissue and blood ("menstrual"), may escape into the peritoneal cavity from the hemorrhagic cyst or from the "endometrial" pockets in the ovary about the site of perforation and, lodging in the natural pockets and peritoneal folds of the pelvis, they may cause adhesions. Adenoma of endometrial type often develops between the adherent folds of peritoneum thus resulting. *These adenomas may be small, and quiescent or they may be invasive. If invasive they may cause "adenomyoma" of the uterus by invasion of the uterine wall from "without" or "adenomyoma" of the uterosacral ligament, round ligament, rectovaginal septum, rectum, sigmoid, etc., namely, whatever structure or organ is invaded by the adenoma arising from the "infective" contents of the cyst or ovary lodging on its surface.* The question naturally arises, In what way do the contents of the cyst or ovary cause the development of these adenomas? Is it due to some "specific" irritant present in the cyst contents which stimulates the peritoneal "endothelium"; thus causing a metaplasia and the development of "endometrial" tissue typical both in structure and in function? Some may assert that dormant "endometrial" epithelium may be present in the tissues soiled by the contents of the cyst and this is stimulated to further growth. *It seems to me that the condition*

Digitized by Google

found in many of these specimens is analogous to the implantation of ovarian papilloma or cancer on the peritoneal surface of the pelvis from the rupture of an ovarian tumor containing these growths.

I offer the following data as evidence that perforating hemorrhagic cysts of the ovary are hematomas of endometrial type.

1. These hematomas, as the uterine mucosa, manifest their "activity" during the menstrual life of the patient.

2. Histologically, the epithelial lining of the ovarian hematomas is similar to that of the uterine hematomas, due to the retention of "menstrual" blood, often present in "adenomyoma" of the uterus.

3. Periodic hemorrhages occur in the ovarian hematomas which are similar in gross and histologic appearance to that of menstruating endometrium.

4. The "chocolate" contents of the ovarian hematomas resemble old menstrual blood.

5. In two patients operated on at the time of the menstrual period, one the day that menstruation was due (Case 13, Fig. 29), and the other the last day of menstruation (Case 19, Fig. 57), the histologic changes in the ovarian "endometrial" tissue corresponded to the phase of the menstrual cycle indicated by the menstrual history of the patient.

6. The fact that material escaping from the ovarian hematomas may give rise to the development of adenoma of endometrial type in the tissues thus soiled is further proof that these hematomas contain "endometrial" tissue.

I cannot state that these ovarian hematomas of endometrial type are the only cause of ectopic pelvic adenomas.

Perforating hemorrhagic cysts of the ovary with their secondary peritoneal "implantations" are a pathologic entity as definite as that of ovarian papilloma and cancer. They are likewise a definite clinical entity which is capable of diagnosis before operation in a large percentage of the cases.

Note: Since sending in this paper for publication in the *Archives of Surgery,* I have had the opportunity to study material from more cases and wish to add this note. I described in this paper small hemorrhagic elevations in the ovaries of patients operated upon during the menstrual period which histologically proved to be due to hemorrhage about or into a space lined by tissue of endometrial type. I stated that I believed that they might develop into perforating hemorrhagic cysts and also might furnish the epithelium for the relining of follicular hematomas which might rupture near them. In my later studies I have found that these small ovarian hematomas may develop into larger ones, i.e., they may give rise to perforating hemorrhagic cysts. I have not as yet been able to demonstrate the relining of ruptured follicular hematomas from this source. The presence of ciliated epithelium in both the ovarian hema-

Digitized by Google

tomas and also in the pelvic adenomas strengthens the implantation theory of the origin of the latter and weakens the serosal theory. The luteal like lining of many of these cysts could be explained as the result of hemorrhage in the walls of an endometrial cyst with consequent loss of the surface epithelium instead of the remains of a follicular hematoma.

Two possible sources of the origin of these small tubules or cysts of endometrial type in the ovary present themselves: first, congenital, and second, acquired from the implantation of epithelium escaping from the tube during menstruation and its subsequent invasion of the ovary. Epithelium escaping from the tubes during menstruation and its subsequent implantation in the pelvis might also be a source of pelvic adenoma of endometrial type other than from perforating hemorrhagic cysts of the ovary.

I wish to thank Dr. George S. Graham, the director of the pathologic laboratory of the Albany Hospital and the Albany Medical School, for his cooperation in placing at my disposal the facilities of that laboratory. The illustrations were made by Miss Miriam Ruth Oliver. As a result of her painstaking care, these illustrations more accurately demonstrate the conditions present than any verbal description. The photomicrographs were made by Mr. James A. Glenn.

REFERENCES

(1) *Novak, Emil*: Abdominal Hemorrhage of Ovarian Origin, Jour. Am. Med. Assn,. April 21, 1917, lxviii, 1160-1162. (2) *Smith, R. R.*: Hemorrhages into the Pelvic Cavity Other than Those of Ectopic Pregnancy, Am. Jour. Obst and Gynec., December, 1920, i, 240-247. (3) *Savage, S.*: Hematoma of the Ovary and Its Pathological Connection with the Ripening and Retrogression of the Graafian Follicle, Brit. Gynæc. Jour., 1906, xxi, 285-305. (4) *Wolf, E. H.*: Ueber Haematoma Ovarii, Arch. f. Gynäk., 1908, lxxxiv, 211, 243. (5) *Hedley, J. P.*: Hematoma of the Ovary with Report of Eighteen Cases, Jour. Obst. and Gynec. Brit. Emp., 1910, xviii, 293-311. (6) *Novak, Emil*: Hematomata of the Ovary Including Corpus Luteum Cysts, Bull. Johns Hopkins Hospital, November, 1917, xxviii, 349-354. (7) *Russell, W. W.*: Aberrant Portions of the Müllerian Duct Found in the Ovary, Bull. Johns Hopkins Hospital, 1899, x, 8-10. (8) *Lockyer, Cuthbert*: Fibroids and Allied Tumors, 1918, New York, The Macmillan Company. (9) *Casler, D. B.*: A Unique, Diffuse Uterine Tumor, Really an Adenomyoma, with Stroma, but no Glands. Menstruation After Complete Hysterectomy Due to Uterine Mucosa in Remaining Ovary, Tr. Am. Gynec. Soc., 1919, xliv, 69-84. (10) *Cullen, T. S.*: The Distribution of Adenomyoma Containing Uterine Mucosa, Arch. Surg., September, 1920, i, 215-283. (11) *Norris, C. C.*: Am. Jour. Obst. and Gynec., May, 1921, i, 831-834. (12) *Runge, E.*: Ueber die Veränderungen der Ovarian bei Syncytralen Tumoren und Blasenmole; Zugleich ein Beitrag zur Histogenese, Arch. f. Gynäk., 1903, lxix, 33-70. (13) *Mahle, A. E., and MacCarty, W. C.*: Ectopic Adenomyoma of Uterine Type (A Report of Ten Cases), Jour. Lab. and Clin. Med., January, 1920, v, 218-228. (14) *Cullen, T. S.*: Adenomyoma of the Rectovaginal Septum, Jour. Am. Med. Assn., March 14, 1914, lxii, 835-839; ibid., August 5, 1916, lxvii, 401-406; Bull. Johns Hopkins Hospital, November, 1917, xxviii, 343-349, and reference 10.

DISCUSSION

DR. RICHARD R. SMITH, GRAND RAPIDS, MICHIGAN.—I cannot discuss Dr. Sampson's paper from the standpoint of a pathologist, but must do so simply from that of a clinician.

Digitized by Google

I became interested in this class of cases about a year ago, at which time I made a study of hemorrhages occurring in the pelvic cavity exclusive of those resulting from ectopic pregnancy. Exclusive of tubes, the seat of pregnancy, the most constant source of hemorrhages in the pelvic cavity is the ovary, first, those occurring from normal graafian follicles, and second, those occurring in ovarian tumors the subject of traumatism or twisting, and third, an interesting group which has troubled us all as to etiology and has masqueraded under the head of hematoma ovarii. We have all met this condition frequently and have been puzzled by it. It is commonly associated with some other pathologic condition of the pelvis, principally myomata.

Dr. Williams in discussing my paper last year before the Society stated that a special study should be made of these cases, since we have, as clinicians, recognized the fact that they form a definite clinical group. It has remained for Dr. Sampson to clear this matter up, and I am sure that gynecologists are grateful to him for having done so. We shall now recognize them as a definite, clinical, pathologic entity, and we shall approach the clinical side of the subject with new interest.

Just how we are to formulate our operative procedures, just what the indications are going to be in dealing with this condition, I think it is a little early to say, but we must bear in mind two things, one of which is, that we are dealing with a neoplastic disease, a disease which is capable of recurrence and further progress, and which may have within it serious future consequences to the patient. In the second place, we are dealing with a disease which apparently shows signs in its life history of retrogression; that is, the process may regress and disappear. Tentatively, I may suggest that we regard them as follows: we must consider those cases complicated by myomata as serious and deal with them radically. In others a more conservative course might well be followed.

DR. N. SPROAT HEANEY, CHICAGO.—I have wondered at the strength of the adhesions binding the ovary to the neighboring structures. Dr. Webster, in his study of ectopic pregnancy, advanced the theory that the pregnancy can only occur in tissue capable of undergoing decidual reaction. Therefore, for many years he doubted the occurrence of true ovarian pregnancy. Later he had two undoubted cases of ovarian pregnancy and then admitted their possibility, but could not correlate his decidual reaction theory with their occurrence. Dr. Sampson has found endometrial-like tissue in the ovary which after all proves Dr. Webster's decidual reaction true. Dr. Sampson has undoubtedly satisfied himself regarding one point concerning which I should like to inquire, namely, whether the endometrial tissue in the ovary is primary and the adenoma in the uterus is secondary to rupture of the cyst, or whether the ovary becomes infected by the endometrial tissue because it becomes adherent to the surface of the adenomyoma. I do not quite understand why the first possibility was accepted and why the second was ruled out of consideration.

DR. EDWARD H. RICHARDSON, BALTIMORE, MARYLAND.—I have seen a few of these cases myself, and certainly it is most satisfactory to have had this convincing proof brought forward as to the origin of these cases of adenoma of the rectovaginal septum and in other scattered tissues of the pelvis. It is remarkable and surprising to me to learn of the frequency of endometrial tissue in the ovary, and in view of this fact I must confess that I am puzzled to know how best to deal with this condition clinically, not only because it occurs apparently in the period of maximum fertility, but also from Dr. Sampson's contribution I got the impression that it very commonly is bilateral. All of us who have had to deal with adenomyoma of the rectovaginal septum know what a serious matter it is. If you

Digitized by Google

have had the opportunity to observe any of these cases to the end, you know that this tumor is essentially a malignant one. It will invade the adjacent pelvic structures in very much the same way as carcinoma, and if you attempt, as I have done in one instance, to remove that tissue from the rectovaginal septum, either by the abdominal or vaginal route, you will find yourself face to face with a most serious and radical operation. I do believe in most instances it cannot be successfully removed unless you are willing to face a procedure of the first magnitude, and even then, in the light of this contribution, you would probably have a recurrence unless you also remove the ovaries. Since I have been reliably informed that radium is ineffective in the treatment of adenomyoma, from our present viewpoint it looks as if one has to choose between hopelessly advancing growth and the removal of both ovaries during the child-bearing period in a condition which is by no means rare.

DR. RALPH H. POMEROY, BROOKLYN, NEW YORK.—As an incidental contribution to this discussion, I want to call attention to the history of a case that is now four years old. I had occasion to do a cesarean section on a young woman for a dermoid in the pelvis which was associated with a breech presentation. After the removal of the dermoid tumor, with a successful cesarean section, closing the incision in the ordinary way, a year following the patient came back complaining bitterly of pain in the abdominal wound, which was aggravated at the time of menstruation. I observed her through the menstrual periods and found a definite mass in the middle of the abdominal wound which between menstruation would subside, but it remained as a hard nodule. I insisted on operation, but she objected for six months. Finally I got her to consent to an operation. I told her I would not take out the uterus or sterilize her. I excised the abdominal scar, including the mass and a wedge from the top of the uterus, which was densely adherent to the abdominal wall. The tissue removed was submitted to a pathologist for examination, who reported adenomyoma. The woman has had no symptoms since and reports herself well. I thought I would add this case to the peculiar histories of hemorrhagic problems associated with adenomyoma in the menstruating woman.

DR. HENRY T. HUTCHINS, BOSTON, MASS.—I would like to ask whether these tumors can be diagnosed previous to operation fairly successfully by the character of the menstrual pain when it occurs and the time it occurs?

Dr. G. BROWN MILLER, WASHINGTON, D. C.—Since Dr. Cullen called attention to adenomyoma of the rectovaginal septum, I have had four cases. In two of these there were tumors in the sigmoid as large as those described by Dr. Sampson. One was operated on by Dr. Cullen, and I do not know whether he examined the tissue from the tumor surrounding the sigmoid or not. The case I operated on proved fatal. We could not get an autopsy, and the tissue surrounding the sigmoid was not removed, so that we do not know the nature of the growth.

I think Dr. Sampson's contribution is a most valuable one. The only difficult part to understand is in the cases where there was a tumor of the sigmoid, was that the tumor was not in contact with the adenomyoma of the rectovaginal septum or the ovaries. There were no adhesions of the bowel to the growth or to the ovary, and it would seem highly improbable that with the sigmoid separated so far from the chocolate cyst, it would lead by implantation to a well developed tumor of the bowel.

A case I have recently seen, answers Dr. Hutchins' question as to the symptoms in cases of adenomyoma of the rectovaginal septum. A woman complained of intense and persistent pain during the menstrual period, which would gradually subside and disappear ten days after the menstrual period had ceased. At the same time, she had definite symptoms of partial obstruction of the lower bowel.

Digitized by Google

Evidently to my mind the tissue in the rectovaginal septum during menstruation caused pressure on the rectum to such an extent as to produce temporary partial obstruction of the bowel. As the menstrual period subsided, so the bowel symptoms subsided. It suggested a line of treatment that would give relief. The most difficult cases I have ever tried to operate on have been the two cases of this nature. The method of treatment which suggested itself was to sterilize the woman by the x-ray or radium. The last case I had had no pain except at the menstrual period, evidently due to the tissue which took part in menstruation, and if we prevent menstruation (in view of the great risk of removing the growth) I believe it would be the logical method of treating these cases. Dr. Cullen, however, to whom I wrote concerning this case, said he had had two cases in which the ovaries had been removed along with the uterus, and in which the growth in the rectovaginal septum had subsequently progressed, causing another operation.

DR. JOSEPH L. BAER, CHICAGO, ILLINOIS, (By Invitation).—Dr. Sampson showed us hemorrhagic cysts that are adjacent to tissue in which we are accustomed to find adenomyoma of the uterus or rectovaginal septum. I should be glad to know whether the doctor has met with cases in which perforating ovarian cysts are in contact with tissue. remote from the uterus or rectovaginal septum, and whether he has found any such adenomyoma in such remote tissue.

DR. CAREY CULBERTSON, CHICAGO.—Dr Sampson's demonstration would appear to clear up in a measure the difference of opinion found to exist in the literature relative to the origin of this type of tumor. Since Lockyer's first report of a tumor of this nature and that of Stevens' six cases in 1915, these tumors have been accepted as neoplasms, but in the German literature we find similar growths described as products of inflammatory reaction. Bartkiewitsch regarded them as muscle hyperplasias and used the term "adenomyometritis;" Amann used the term "retrocervical fibroadenomatous serositis," and Myer "adenomyositis uteri et recti." Stevens and Cullen have insisted that these tumors are true neoplasms, though usually bound up with extensive and dense adhesions, and it is this latter condition which is now explained so ably by Dr. Sampson, together with what would appear to be proof that these growths are true neoplasms. We now see that certain ovarian cysts may contain tissue identical in type with that of the mucosa of the uterine body, that such a cyst may spill its contents into the pouch of Douglas and give rise not only to proliferation of the adenomatous structure but to the formation of dense adhesions.

DR. WALTER WILLIAM CHIPMAN, MONTREAL, CANADA.—When Dr. Sampson refers to endometrial tissue in the ovary, he uses that merely as a descriptive term. He does not mean the endometrium is in the ovary because genetically the two tissues of the müllerian tract and ovary are different.

I would like to ask another question. Would not the cellular spill from such a cyst thrown down into the pouch provide for the epithelium which we find in these glandular acini and the fibrous and muscle tissue by the reaction from this secretion?

DR. SAMPSON, (closing).—In answer to the questions which have been asked, I believe the growth is primary in the ovary, and not in the adenomyoma, and that the extension is from the ovary to the uterus and not from the uterus to the ovary. Cases have been reported in which adenomyoma was adherent to the ovary and the adenomyoma invaded the ovary. I think these cases might also admit of a reverse interpretation. In several of my cases the perforating hemorrhagic cyst of the ovary was not in contact with the growth in the culdesac, and I have some slides in which there were many adenomatous growths in the pelvis. The contents

Digitized by Google

of the ovary had apparently escaped into the pelvis, and the adenomatous growth was found in the vesicouterine reflection of the peritoneum, around the round ligament, between the tubes and the ovarian ligament, and also in the culdesac, i.e., in any pocket in which such material would likely fall. Just exactly as in papilloma of the ovary these pockets may contain papillary implantations.

The question has also been asked, are all cases of adenomyoma of the rectovaginal septum and other ectopic adenomyomata, associated with perforating hemorrhagic cyst of the ovary? I cannot answer this question. The literature on the subject is not of very much value in determining this point, because the men who have reported ectopic adenomyomata were apparently more interested in the adenomatous growth than they were in the condition of the ovaries. In my own experience all the definite cases of ectopic adenomyomata were associated with these cysts. I have had two cases in which there were small nodules in the culdesac which I excised, and histologically it was difficult for me to determine definitely whether they were adenomyomata of endometrial type. I thought they might be. I examined the ovaries in these two cases, but could not find any gross evidence of these cysts. Hysterectomy was necessary in both cases, and the uterus was removed together with the ovaries. In each instance on examining the ovaries microscopically spaces were found lined by columnar epithelium and stroma resembling endometrium which might have been these cysts that had almost completely retrogressed. I believe these ovarian hematomata passed through a process of development, followed by one of retrogression, so that the smaller ones might almost entirely disappear. I do not wish to speak more about this phase of the subject because my views are not definitely formulated, and I am afraid I might say something which may not be true, even though I believe them at the present time; I wish to reserve such remarks until I know more about the subject.

I think it is possible that we may find ectopic adenomyoma without any gross evidence of these cysts, and yet they may come from these cysts primarily or from pockets in the ovary containing tissue of endometrial type. In other words, ectopic adenomyoma may persist long after the cysts or ovarian condition has disappeared.

Dr. Hutchins asked about making the diagnosis from the history and from the physical signs. Dr. Richardson and Dr. Miller have spoken about advanced cases. The latter are the exception. The less extensive cases are much more common. The history varies greatly. In the moderately advanced cases pain is often present, but there is nothing characteristic about the pain unless there is involvement of some such structure as the rectum, as brought out by Dr. Miller. I think, however, acquired dysmenorrhea of short duration and of the progressive type is a fairly common symptom.

In regard to the physical signs, the advanced cases resemble malignancy. In moderately advanced cases, it is possible to make a diagnosis. In the cases I reported tonight, 23 in number, I believe it was possible to have made a diagnosis before operation in one-half of them, but I did not do so. However, in the last year, I have made a diagnosis in about half of them before operation. We are able to make a diagnosis of a malignant ovarian cyst from the following physical signs; the ovarian cyst is adherent and we may also find involvement or implantations in the culdesac. If we find those two signs, I believe we are dealing with a malignant ovarian cyst. In the condition under discussion, we find an adherent ovary which feels like an adherent cystic ovary or a hydrosalpinx. In addition to that, we may feel a localized induration in the culdesac which is often nodular and does not resemble the conditions resulting from chronic pelvic inflammatory disease. When we find this combination of physical signs in a woman between thirty years of age and the menopause (often coupled with a retroflexion of the uterus) we can make a pretty reasonable diagnosis of this condition.

Digitized by Google

Its treatment is still in the experimental stage. I cannot help but think, from my own experience, that ovarian conservatism is a rather dangerous experiment. Of three cases, I operated on over a year ago in which I removed one ovary, I have operated on one since and two I have examined lately. In one of the latter I could feel an adherent enlarged ovary on one side and induration in the culdesac between the rectum and the uterus. I believe that the remaining ovary has caused a continuation of the growth already in the culdesac, or possibly in freeing the ovarian hematoma removed at the time of the operation I was responsible for causing the escape of the contents of the cyst and its subsequent growth in the culdesac. The other case showed a somewhat similar condition, but not so marked.

Dr. Culbertson brought out a very interesting point. There has been considerable written on the so-called inflammatory origin of adenomyoma in which is advocated a belief that adenomyoma may arise from the irritation of the peritoneum so that the endothelium is converted into tissue which is histologically similar to endometrium, and not only that, but may function as such. These writers would consider the work which I have done as confirmatory of their views. It seems to me that it is more analogous to the implantation which occurs from a ruptured ovarian cyst containing papilloma or cancer than a metaplasia of the endothelium of the peritoneum arising from some specific irritant in the contents of this hematoma.

Dr. Chipman spoke about endometrial tissue in the ovary. I prefer to speak of it as tissue of endometrial type.

DR. CHIPMAN.—My question was, would not the cellular spill from such a cyst thrown down into the pouch provide for the epithelium which we find in these glandular acini and fibrous and muscle tissues, by the reaction from this secretion?

DR. SAMPSON.—I believe it would. The spill of the cyst carries with it the epithelium which lines it or is situated in the periphery of the ovary at the site of perforation. This epithelium we find in may instances invades the surrounding tissue without reaction on the part of the tissue, and when a reaction takes place, it is not that of a true inflammation, but a hypertrophy of the muscle and of the connective tissue just as we find in an ordinary myoma. It is an extension of this epithelium from the peritoneal surface of the uterus into the uterine wall. I showed in one section in which the growth had invaded the uterine wall that there was no characteristic uterine stroma about it near the surface, but as it extended deeper the characteristic uterine stroma developed around the invading adenomyoma suggesting that the stroma in this instance was derived from the tissue which was invaded and not carried by the growth. I think in some instances pieces of tissue containing both glands and stroma may become deposited in the culdesac and there develop, as I expect to show in another communication.

Digitized by Google

BACTERIOLOGY AND PATHOLOGY OF FALLOPIAN TUBES REMOVED AT OPERATION

By Arthur H. Curtis, M.D.
Chicago, Ill.
From the Pathologic Laboratory and Gynecologic Service of St. Luke's Hospital

THE present report covers an investigation of fallopian tubes from nearly three hundred patients. One hundred and ninety-two of these have been subjected to most painstaking bacteriologic and histologic study.

Before considering diseased tubes, I wish to make a brief survey of associated previous studies which concerned infections of the external genitalia, the cervix, and the body of the uterus. Investigation of the endometrium of 118 uteri, removed to remedy various pathologic conditions,[1] showed that chronic endometritis, as a clinical entity, is very uncommon; persistent infection of the endometrium almost never exists unless maintained by other lesions, such as cervicitis or cellulitis. During the same study of the endometrium, in certain cases normal scrapings were obtained from the uterus; then, several days thereafter, in the endometrium secured by hysterectomy, many bacteria and histological evidence of acute endometritis were found. It would appear, therefore, that curettage is not to be regarded as a perfectly harmless procedure. In the work on tubal infections which is herewith reported, evidence has been obtained which serves to emphasize particularly the dangers of curettage or other uterine instrumentation in patients whose pelvic organs already harbor living bacteria.

Although the corporeal endometrium tends to remain free from chronic infection, histologic examinations and cultures from cervices obtained at operation have revealed that bacteria frequently lodge in these tissues, notably in the vicinity of the actively-secreting glands of the mucosa. It has been found, also, that granulations and strictures are often present in the canal of the cervix; the frequency and importance of these granulations and strictures seems not to have been sufficiently recognized.

It should be noted, also, that infection is often present in the upper cervix as high as the level of the internal os. This fact demands special emphasis for several reasons: first, the channel is more constricted near the internal os and infectious processes are particularly stubborn here because drainage is easily interfered with; second,

[1] A combined bacteriological and histological study of the endometrium in health and in disease. Surg., Gynec., & Obst., 1918, xxvi, 178.

Digitized by Google

upper cervix discharges persistently bathe the lower cervix with infectious material and prevent recovery of the latter; again, surgical removal is exceedingly difficult, and even the ingenious operation of Sturmdorf is not sufficiently extensive to yield consistently good results in this type of case.

That special importance attaches to infections of the cervix is evident not only from the disappearance of discharge, but also from notable improvement in general health which follows complete removal of the endocervix or dilatation and radium destruction of the hypertrophic cervical glands.

One other source of chronic leucorrhea, although less important than disease of the cervix, must be emphasized. This is infection of Skene's ducts. Destruction of these ducts very frequently results in cessation of persistent vulvovaginitis.

The diseased tissues from the 192 cases submitted to bacteriological study have been placed in sterile towels immediately upon removal from the abdomen. Smears have been made and all except portions saved for histological examination have been thoroughly ground and the entire material inoculated into culture media. A considerable variety of media has been used. Meat-infusion-ascites-blood-agar, under partial oxygen tension, had yielded most uniform success in cultivation of the gonococcus.

For convenience in study, these patients have been arranged in three groups: those with grossly active inflammation, those with

TABLE SHOWING THE INCIDENCE OF BACTERIA IN PATHOLOGICALLY ALTERED FALLOPIAN TUBES FROM 192 PATIENTS

Type of Cases	Number of cases	No growth	Growth								Tuberculosis
			Total number	Gonococcus	Non-hæmolytic streptococcus	Hæmolytic streptococcus	Anaerobic streptococcus	Bacillus coli	Mixed growth	Bacillus proteus	
Gross evidence of active inflammation	64	29	33	19*	2*	2	5*	3	3*	1	3*
Histological (grossly negative) evidence of active inflammation.....	38	27	5		4	1					6
No evidence of active inflammation..	90	90	0								
Total	192	146	38	19	5	4	5	3	3	1	9

*Both gonococci and nonhemolytic streptococci, 1 patient; anaerobic streptococci with other growth, 1 patient; tuberculosis with anaerobic streptococcus infection, 1 patient.

inflammation demonstrable only upon microscopic examination, and those without definite evidence of an active process.

Cultures were positive in 38 cases, as follows: gonococcus, 19; nonhemolytic streptococcus, 6; hemolytic streptococcus, 3; anaerobic

Digitized by Google

streptococcus, 5; bacillus coli, 3; mixed infection, 3; bacillus proteus, 1. Nine revealed tuberculosis.

Gonococcus, 19. It should be emphasized that the cultures have been made from the entire thoroughly ground fallopian tube, with the exception of certain portions reserved for histologic examination. In material so studied it has never been possible to obtain gonococci from patients who failed to reveal gross evidence of active inflammation at the time of operation (Table).

It has heretofore been impossible to form a definite clinical estimate of the length of time which the gonococcus remains viable in the fallopian tubes; this is particularly true of those cases in which patients give evidence of recurrently active or persistent tubal disease. It has long been known that gonococci soon disappear from the tubal mucosa, but proof that infection does not persist in the deeper tubal structures has been wanting. Whether the gonococcus produces a chronic salpingitis or these patients suffer from repeated gonorrhea of the tubes seems to me an important issue. It is, therefore, of interest to note that in this work, in all of which cases the fallopian tubes were ground and promptly cultured according to approved modern methods, it has rarely been possible to obtain viable gonococci from patients who have been free from fever and leucocytosis for a period of more than 10 days or 2 weeks. The fact that good growth was obtained in more recent tubal infections is evidence of satisfactory cultural methods. In view of the many cases studied in this way I feel warranted in the deduction that the gonococcus lives but a short time in the tube; in other words, it seems that the fallopian tube is not to be regarded as a focus of chronic gonorrheal infection. Persistently active gonorrhea of the tubes is evidently ascribable either to recurrence of infection from without or repeated invasion of bacteria from the chronically infected lower genital tract.

Detailed description of these 19 cases which yielded gonococci in cultures would not be of material interest. It will perhaps be a surprise to many clinicians that secondary mixed infection has not often been encountered. Only one patient, with exceptional persistence of the gonococcus, merits special attention. This patient, free from symptoms of an acute nature, had been curetted for relief of leucorrhea and one tube had been removed six months before admission to our service. We found an abdominal fistula communicating with the tube which remained. Upon removal, this tube yielded the gonococcus in pure culture. In so far as could be ascertained, there had been no recent exposure to fresh infection and no instrumentation of the cervix.

The relation of instrumentation to gonococcal disease of the tubes may be illustrated by mention of 5 other patients; 3 of these, previously subject to slight pelvic discomfort, had elsewhere been curetted

Digitized by Google

for relief of leucorrhea, and thereafter suffered from constant tubal distress; at operation all revealed salpingitis with adhesions. Two others (these treated throughout by me) acquired subacute mild tubal infection following intracervical silver nitrate treatments for relief of leucorrhea. It seems that there is distinct danger of low-grade salpingitis from repeated instrumentation of the infected cervix.

Nonhemolytic streptococcus, 6. Not only in the nonhemolytic group, but also in infections with other types of streptococci, pathologic evidence of an active inflammatory process was sometimes encountered long subsequent to the introduction of infection; furthermore, bacteria were more persistent than the pathologic evidence would indicate. Streptococci were occasionally isolated in pure culture many months, or even years, after the acute process had subsided.

Nonhemolytic streptococci were isolated from the tubes of 2 patients with grossly active inflammation and from 4 in whom the microscope was required to reveal that an active process still persisted (Table).

From a patient with history of two years' illness, in whom there was a right pyosalpinx and left hydrosalpinx with cystic ovary, both streptococci and gonococci were found in cultures.

Another patient gave history of instrumental termination of a six weeks' pregnancy in 1918. Two months later, fearing another pregnancy, she inserted a catheter and also received intrauterine instrumentation by a physician. Offensive leucorrhea and pelvic discomfort, increasing in severity, persisted until 1920, when the patient came under the care of Dr. Watkins. Cervical treatments were tried for one month. Operation at the end of that time revealed enlarged tubes which were convoluted, but not nodular. The fimbriæ were swollen, slightly adherent, not occluded. Firm adhesions completely covered the retroverted uterus and tubes. Bacteriologic study revealed streptococci.

One patient with typical nonhemolytic streptococcus infection was forty-eight years of age, with four healthy children. She gave history of two spontaneous miscarriages. Manual removal of the placenta after the first miscarriage, twenty-three years ago, had been followed by infection with recurrence every few months from that time, the last attack seven months prior to operation. The abdomen, when opened, revealed monster hydrosalpinx, one ovary of double size, and a large uterus. Numerous colonies of nonhemolytic lancet-shaped, short-chained streptococci, nonvirulent for rabbits, were present in cultures.

The other 3 patients whose tubes yielded nonhemolytic streptococci all gave history of prolonged illness subsequent to abortion with infection.

Hemolytic streptococcus, 3. A patient who had long suffered from

Digitized by Google

moderate pelvic pain had elsewhere been dilated by means of a laminaria tent and then curetted. She entered our service acutely ill. A mass, apparently in the right tube, extended into the culdesac and yielded foul pus on vaginal puncture. Cultures showed great numbers of hemolytic streptococci.

Another patient, with history of gonorrheal infection, had a fist-sized tubo-ovarian inflammatory mass; the other tube showed typical gonorrheal changes upon both gross and microscopic examination. Smears and cultures contained many long-chained hemolytic streptococci, but no gonococci. It appears probable that there had been a primary gonorrheal salpingitis with implantation of subsequent streptococcus infection.

Hemolytic streptococci were obtained from one patient, thirty-four years old, with history of abortion from an unknown cause at the age of twenty-nine. She suffered from severe persistent pelvic pain. Drainage, performed two months before operation, yielded an abundant tenacious fluid containing gram-positive diplococci. Upon abdominal section both tubes and ovaries were found buried in old inflammatory exudate and adhesions, and were difficult to identify. Histologic examination of the tubes revealed thickening, large areas of lymphocytic infiltration in the deep wall of the tube, and an intact endosalpinx with much cellular exudate, including a moderate percentage of plasma cells. Cultures yielded enormous numbers of hemolytic streptococci. Rabbits injected intravenously with these bacteria developed purulent arthritis and acute nephritis.

Anaerobic streptococcus, 5 (see "mixed growth"). A large patient, with postabortive pelvic infection of two years' duration, failed to improve after many months of palliative treatment. At operation there was ruptured a thin-walled cystic mass deeply buried in the left pelvis. The contents were serous but foul-smelling. The tube and ovary on that side were adjacent to the mass, much enlarged and firmly adherent. The resistance of adhesions was particularly noted. Cultures contained numerous colonies of anaerobic streptococci.

A patient with one son wished to avoid further childbearing. She had been repeatedly aborted without serious trouble until, finally, two successive attempts to rid the uterus of another pregnancy were followed by severe infection. Upon subsidence of acute symptoms she remained incapacitated because of persistent distress in the right lower quadrant, and continued to suffer greatly at the time of my first examination, six months after the onset of infection. A cyst-like inflammatory mass was palpable in the right pelvis. There was no fever, no leucocytosis. At operation was found a foul-smelling right ovarian abscess the size of a grape-fruit, the right tube firmly adherent and seminecrotic, the fimbriæ free. The other tube was also adher-

Digitized by Google

ent to the abscess and edematous, but was free at the fimbriated extremity. Smears of the pus revealed numerous gram-positive diplococci and a smaller number of small gram-negative bacilli. In cultures, the gram-negative bacilli failed to develop, but anaerobic streptococci were present in rich pure growth. These streptococci were not virulent for experimental animals.

A woman of forty-three, married six years, had never been pregnant. The history and physical examination indicated a persistently recurrent gonorrheal infection of the fallopian tubes. Upon removal, the tubes were found to be considerably enlarged, with greatly thickened walls and closed fimbriated ends, the lumen filled with green-yellow pus. A rich growth of long-chained anaerobic streptococci was recovered in pure cultures. There were no gonococci.

A patient who had been operated upon three years before, for chronic disease of the tubes, presented an abdominal sinus. This sinus communicated with an enormous necrotic ovary by means of an almost solid fistulous tract, the size of one's little finger. Smears and cultures from the necrotic material yielded great numbers of anaerobic streptococci. Histologic examination showed typical tuberculous changes.

Bacillus coli, 3. A patient married thirty-seven years, never pregnant, with history of chronic vesical distress and chronic pelvic pain, had greatly enlarged tubes closed at the fimbriated ends. One tube contained thick yellow pus; all other evidence indicated chronic salpingitis of gonorrheal origin. Bacillus coli was recovered in pure culture from the pus as well as from the ground wall of the tube.

A girl with history of gonorrheal infection for over one year was operated for relief of a persistent ovarian abscess. This abscess contained nearly a litre of pus and revealed numerous colon bacilli in smears and cultures. There were no gonococci. The chronically diseased tubes presented both gross and microscopic changes typical of gonococcal infection.

A somewhat similar case is that of a young woman with an infected thick-walled cyst of the ovary. Both tubes were enlarged and chronically inflamed, with pathologic changes typical of gonorrheal disease. Cultures revealed pure growth of bacilli of the colon group.

From the tubes of several other patients occasional colonies of colon bacilli were isolated.

Mixed growth, 3. In two patients, whose clinical history and external genital examination pointed toward venereal infection, persistent tubo-ovarian abscesses were encountered. Numerous bacteria, chiefly gram-negative cocci, were obtained. There were no gonococci, but pathological changes were typical of that disease.

In this connection it should be mentioned that colonies of staphylo-

Digitized by Google

cocci and diphtheroid bacilli, notably the former, have been fairly numerous throughout this work. Except when many colonies have been present, the control histological study has permitted the inference that they were incidentally present; more numerous colonies have a few times been suspected to play a more important rôle.

A patient who was free from venereal disease and had been infected as a result of criminal abortion, was thereafter curetted and subsequently underwent vaginal drainage for an accumulation of pus in the pelvis. Symptoms persisted from that date. At operation, one year later, we found a greatly enlarged left ovary containing a small amount of foul pus. The tubes were densely adherent, three times normal size and very firm; the fimbriæ were open. Both smears and cultures revealed anaerobic streptococci and many fusiform bacilli; there was also a considerable mixture of other bacteria, notably staphylococci.

Bacillus proteus, 1. A patient without history or external evidence of venereal infection, whose husband upon examination revealed no suggestion of gonorrhea, was operated upon for relief of pelvic infection. Both tubes were moderately enlarged and one contained mucus and blood. The fimbriated extremities were not occluded. Bacteriologic study revealed a rich growth of bacillus proteus in pure culture. Histologic examination showed an active inflammation of the endosalpinx. There were numerous polynuclear leucocytes and many round cells, of which a large proportion were plasma cells. The inflammation was restricted to the vicinity of the tube lumen; the deeper mucosa and muscle layer were essentially free from invasion. Integrity of the columnar epithelium and absence of adhesions between the folds of endosalpinx were also noted.

PATHOLOGY[2]

A. GONORRHEAL DISEASE OF THE TUBES

From the clinical history, examination of the external genitalia, and evidence obtained at operation, together with laboratory study of the tubes in this series of nearly 300 patients, it has been possible to determine that gonococcal infection was responsible for the pathologic changes in more than 70 per cent of the cases. Approximately 10 per cent more were thought to have been primarily infected with the gonococcus, but this could not be determined with certainty.

The gross features of recently diseased gonorrheal tubes require no description. That they become enlarged, particularly at the outer ends, that they fall downward and backward, that the fimbriæ become

[2]For literature concerned with the pathology and salpingitis of acute infectious origin, the reader is referred particularly to the following: Schridde, Deutsch. med. Wchnschr., 1909; also Verhandl. d. Gesellsch. deutsch. Naturf. u. Aerzte, Leipzig, 1908, lxxx, 2 Th., 2 H. 47; Amersbach, Monatschr. f. Geburtsh. u. Gynaek., 1910, xxxii, H. 4, 444; Heynemann, Ztschr. f. Geburtsh. u. Gynaek., 1912, lxx, 870; Ploeger, Arch. f. Gynaek., 1911, xcv, 634.

Digitized by Google

occluded, and that adhesions are numerous, is common knowledge. It is less well known that after cessation of the active process, those tubes which have undergone only catarrhal changes, without retention of fluid within the tube, rarely show much enlargement; often they are atrophic. There is a tendency to remain indurated and somewhat nodular, and, whenever other lesions persist, it is usual to find occlusion of the fimbriæ.

Several tubes, with only slight changes, have served to verify the mechanism of tubal occlusion described by Ries.[3] It appears that inflammation of the serosa is followed by scar formation which, upon contraction, makes a more or less complete purse-string closure, with inversion of the fimbriæ.

Fig. 1.—Salpingitis nodosa. Microscopically, a gonorrheal abscess in the tube wall.

More frequently, perhaps, and notably in the presence of ovarian infection or other extensive inflammation, the tube occludes by plastering itself upon the ovary, uterus, or broad ligament.

It has been particularly noted that a single attack of salpingitis seldom results in marked permanent increase in thickness of the tube wall. Greatly thickened tubes are most often associated with repeated exposures. If the patient can be early isolated from the source of her infection there is reason to expect moderate tubal changes. Only occasionally are gonococci sufficiently virulent to make an exception to this general rule.

Persistent pyosalpinx exemplifies gonorrheal infection in severe form; it is particularly characterized by hyperplasia and induration

[3]Ries, E. The mechanism of occlusion of the tube. Am. Jour. Obst., 1909, lx, No. 2.

Digitized by Google

of the tube wall. In a lesser measure the same rule holds true for the tubal changes of hydrosalpinx. The belief that hydrosalpinx and pyosalpinx are fundamentally different lesions has not been borne out by this study. A comparison of histologic material reveals innumerable gradations from one to the other.

In greatly thickened old tubes, blood vessels are very numerous. Aside from recognized tubal pregnancy, none of which cases is wittingly included, there have been studied more than half a dozen such tubes with rich blood supply in which there was extensive hemorrhage within the tube lumen. By means of serial sections it was possible to demonstrate the site of blood vessel rupture in one case. The question arises whether we have not placed too much reliance upon hematosalpinx as a dependable evidence of tubal gestation. Possibility of

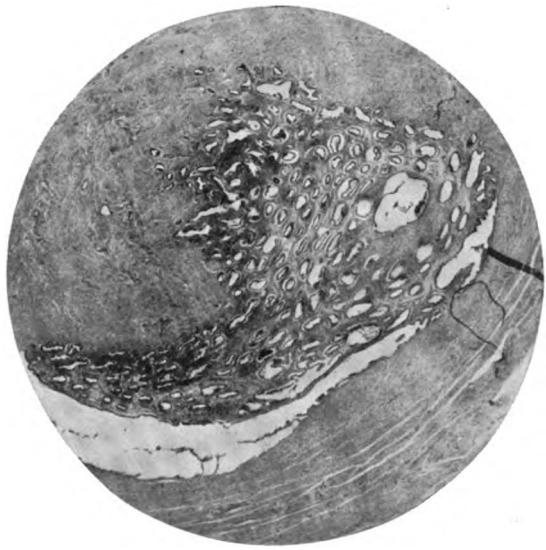


Fig. 2.—Salpingitis nodosa. Grossly identical with the nodule seen in Fig. 1. Serial sections reveal an adenomyoma of the tube. Removed from a patient with many children and without history or evidence of pelvic infection.

this error is increased by the fact that microscopic examination of these blood-filled, greatly thickened tubes reveals an overgrowth of distorted villi which might easily be mistaken for the chorionic villi of pregnancy.

So-called "salpingitis nodosa" has been the subject of much discussion. There has been a tendency to ascribe all of these tubal nodulations to gonorrheal infection. Some few authors have adhered to the belief that they are due to congenital anomalies. All are agreed that the majority of such tubes reveal, histologically, nests of gland-like columnar epithelium buried beneath the mucosa. My experience agrees with that of Ries,[4] who asserts that nodules of the tube are due

[4]Ries, E. Nodular forms of tubal disease. J. Exper. Med., 1897, ii, 347.

Digitized by Google

to many causes, inflammatory and noninflammatory; the microscope best explains the etiology of any doubtful case. It would appear that the vast majority are inflammatory in origin, notably the result of gonorrheal infection; less often tuberculosis is responsible. That gland-like nests of cells need not necessarily be present is evident from study of a tube which revealed, grossly, a typical picture of salpingitis nodosa, and microscopically presents an interstitial gonorrheal abscess (Fig. 1). A grossly identical nodule, incidentally discovered at the time of appendectomy, was removed from a patient with many children and without history or evidence of infection; this proved to be an adenomyoma of the tube (Fig. 2).

The adhesions encountered in gonorrheal cases possess a distinctive clinical characteristic; they can be separated by manipulation or

Fig. 3.—Gland-like nests of columnar cells buried in wall of tube. Gonorrheal infection. Longitudinal and serial sections reveal that these nests communicate with the tube lumen.

blunt dissection, without cutting. When the tubes and ovaries could not be freed in this manner, irrespective of the severity or duration of the salpingitis, there was evidence of infection with other bacteria. There was a single notable exception; a young married woman had been assaulted when a girl and at that time suffered from symptoms typical of gonorrheal disease. External examination revealed evidence of healed infection which substantiated the history. At operation there was found a matting together of the pelvic viscera, such as has been encountered after extensive radium treatment of cancer cases. Although I was tempted to ascribe the pathologic changes to an associated infection with other bacteria, neither history nor laboratory evidence justified that assumption. Upon two other occasions when

Digitized by Google

very dense inseparable adhesions were encountered, there was no preoperative history of disease other than gonorrheal infection; it was subsequently learned, however, that both patients had previously undergone instrumental abortion with severe infection.

Histology. In the early stages there is swelling of the endosalpinx with more or less destruction of the columnar epithelium. Fusion of adjacent folds of villi is frequent; this is a characteristic feature. Later, the mucosa often becomes much crippled and distorted. Gland-like nests of columnar epithelium are sometimes found deeply buried in the wall of the tube and inflammatory diverticula extend far beneath the mucosa (Fig. 3); this is particularly true of tubes with pyosalpinx or hydrosalpinx.

Fig. 4.—Mucosa of healed gonorrheal tube; typical adhesions between villi.

The cellular exudate of gonorrheal salpingitis is not confined to the mucosa but penetrates all layers of the tube wall. The most intense inflammatory reaction, however, is in the mucosa, and here it persists until healing is complete.

Aside from polynuclear leucocytes, whose numbers vary in proportion to the activity of the process, lymphocytes and plasma cells predominate. The exact diagnostic significance of plasma cells as evidence of gonorrheal infection requires mention. Plasma cells are characteristic of gonorrheal salpingitis and most strongly suggest this disease. But it may be positively stated that they are not to be depended upon as pathognomonic; they are often present and are sometimes numerous after nongonorrheal postabortive infection.

In the course of time, if there has been only a catarrhal salpingitis,

Digitized by Google

there may remain very little change in the tube. All cellular exudates may eventually disappear, but, even with excellent recovery, the microscope reveals adhesions between villi (Fig. 4) and an unusually abundant blood supply.

After pyosalpinx, and to a lesser degree after hydrosalpinx, all histological lesions in the healed tube are more extreme than those which follow simple catarrh of the tube. In that portion not thinned out by fluid pressure there is hyperplasia of the wall and a varying amount of distortion of the muscle layers. The previously mentioned nests of columnar epithelium are particularly worthy of mention. Longitudinal or serial sections of the tube reveal that most of these

Fig. 5.—Typical nongonorrheal tubal lesion. Marked perisalpingitis with adhesions. The fimbriae are usually free, the mucosa little affected.

deeply buried gland-like nests of columnar cells are really connected with the mucous lining of the tube.

B. TUBAL DISEASE OF OTHER ACUTE INFECTIOUS ETIOLOGY*

In somewhat more than 15 per cent of these patients the tubal pathology is believed to have been entirely due to other pus-producing bacteria, notably streptococci.

Tabulation of the gross changes encountered in these nonvenereal infections reveals that, when salpingitis occurred, it was most often but a part of the pathologic picture rather than the chief lesion. Cases

*The conclusion that gonococci had not been present is based upon negative evidence as well as upon examination of the diseased pelvic organs. When possible, an examination of the husband, including a search of the urine for residual evidence of old infection, has been made. Uncertain cases, those patients with thickened Skene's ducts, urethral granulations, Bartholin duct involvement, or with history of notable urinary disturbance, are excluded from the nongonorrheal group.

Digitized by Google

in which the tubes present the essential pathology seem not usual in such infections. The most notable exception to this is the fairly frequent occurrence of nongonorrheal hydrosalpinx. Occasionally pyosalpinx complicates a puerperal abscess of the ovary.

The diagnosis of salpingitis of a nongonorrheal nature is usually possible even in the absence of growth in cultures. As just mentioned, the tubal changes may present but a minor part of the picture. The typical lesion consists in perisalpingitis with adhesions which vary in number and density (Fig. 5). The adhesions are often delicate and few; this seems particularly to characterize mild colon bacillus infections. On the other hand, virulent streptococci leave most dense adhesions without available lines of cleavage. Firmly bound, matted tis-

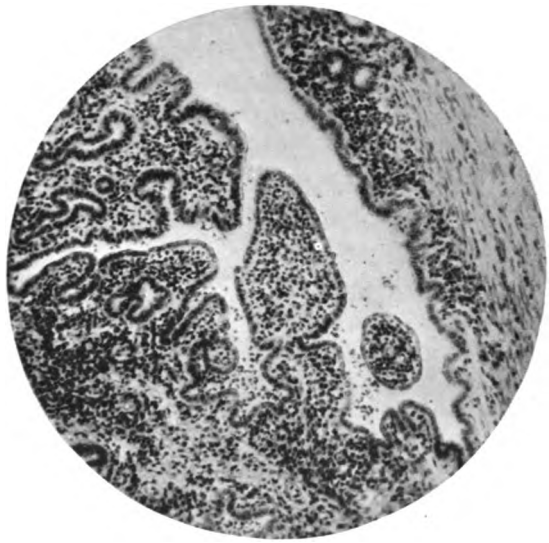


Fig. 6.—Nongonorrheal tubal disease, less common than that shown in Fig. 5. Even with extensive inflammation of the endosalpinx, as here shown, few adhesions form between the villi provided the tubes remain patent. This patient had persistent tubo-ovarian streptococcus infection; operation 1 year subsequent to pelvic drainage of puerperal abscess.

sues, which resist all attempts at blunt dissection, speak strongly for streptococcus or tuberculous infection. Even though there has been a primary gonorrheal salpingitis, adhesions which necessitate extensive cutting suggest that other infection has also been present.

The tube walls may reveal little change. Palpable induration is often wanting. The fimbriated ends tend to remain patulous. The microscope most often fails to show extensive changes of the endosalpinx.

Even if there be extensive inflammation of the endosalpinx, few adhesions form between the folds of the mucous membrane provided the fimbriated ends of the tubes remain open (Fig. 6).

Digitized by Google

There is much less desquamation of the epithelium, and plasma cells are less common than in gonorrheal infection. The assertion that the villi are never so filled with cellular exudate and are never so "fat" as in gonorrheal disease, is contrary to my experience.

In those much less common cases which present occluded fimbriæ

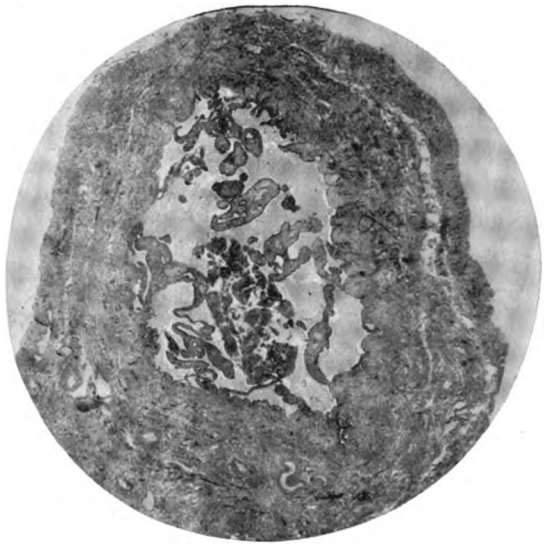


Fig. 7.—Streptococcus hydrosalpinx; a less common type of nongonorrheal tubal lesion. Such tubes reveal adhesions between villi, buried nests of columnar cells, and other features supposed to characterize gonococcus infection; histological evidence alone is inadequate for positive differential diagnosis.

Fig. 8.—Tuberculous salpingitis. The mucosa is the chief seat of infection. Hyperplasia of the mucosa, dense adhesions between villi, great numbers of giant cells, and extensive tubercle formation are usual microscopic features.

Digitized by Google

and accumulated fluid within the tube, attempts to differentiate from the corresponding tubes of gonorrheal disease have been unsatisfactory. My experience indicates that the villi frequently adhere; buried nests of columnar cells are found, just as in gonorrheal infection. There is perhaps a tendency to less cellular infiltration. Plasma cells are not so evident. If we may judge from the present study, however, it is extremely difficult to make a certain diagnosis of streptococcic hydrosalpinx or pyosalpinx from the histological evidence alone.

C. TUBERCULOUS SALPINGITIS (EXCLUSIVE OF GENERALIZED TUBERCULOUS PERITONITIS)

Tuberculous tubes, in the absence of generalized tuberculous peritonitis, were encountered in 5 per cent of these patients.

Not once was tuberculosis diagnosed in the operating room, although several times suspected and looked for. Careful postoperative scrutiny in the laboratory revealed gross tuberculosis in less than one-half of these patients; in 3 an appearance suggestive of tuberculosis was confirmed by the microscope.

Nearly all of these tubes were held by dense adhesions; in only a few cases were they comparatively free. Many of the adhesions could not be separated by blunt dissection and were firmly resistant even on cutting.

In general the gross pathology was similar to severe recurrent gonorrheal salpingitis. Pallor was sometimes a distinctive feature. The tubes were all considerably enlarged and usually much indurated. Pus tubes of enormous size and tubes with extensive calcification, as described by Williams[5] and others, were not encountered.

The fimbriated extremities of the tubes were adherent or occluded in two-thirds of the cases; caseous material could be expressed from some of the tubes which remained open. Experience with this small group of patients indicates that occlusion of the fimbriæ is frequent, but distinctly less usual than in gonococcus infections of corresponding severity.

The opened tubes revealed that thickening was chiefly due to hyperplasia of the mucosa. The tube lumen was often tortuous, partly obstructed or obliterated. Gross tubercles and ulcerations, although present, were not observed in this series so numerously as in Williams' cases.

The chief histologic features were adhesions between the hyperplastic folds of mucosa, great numbers of giant cells, and numerous tubercles. The muscle layers and serosa were seldom involved.

---

[5]Williams, J. Whitridge. Tuberculosis of the female generative organs. Johns Hopkins Hospital Reports, 1893, iii, 85.

Digitized by Google

CONCLUSIONS

1. From the clinical history, examination of the external genitalia, and evidence obtained at operation, together with laboratory study of the tubes in this series of nearly 300 patients, it has been possible to determine that gonococcal infection was responsible for the pathological changes in over 70 per cent of the cases. Approximately 10 per cent more were thought to have been primarily infected with the gonococcus, but this could not be determined with certainty.

2. In somewhat more than 15 per cent of these patients the tubal pathology appears to have been entirely due to other pus-producing bacteria, notably various types of streptococci.

3. Tuberculous tubes, in the absence of generalized tuberculous peritonitis, were encountered in 5 per cent of the cases.

4. Bacillus coli is particularly frequent in tubo-ovarian abscesses of large size. As a primary cause of salpingitis neither the colon bacillus nor the staphylococcus appears to be of notable importance.

5. It has almost never been possible to obtain gonococci in cultures from thoroughly ground fallopian tubes removed from patients who have been free from fever and leucocytosis for a period of more than 10 days or 2 weeks. The fallopian tube appears, therefore, not to be a focus for chronic gonorrheal infection. Persistently active gonorrhea of the tubes is evidently ascribable either to recurrence of infection from without or repeated invasion of bacteria from the chronically infected lower genital tract.

6. Tubal infections with various types of streptococci yielded pathological evidence of an active inflammatory process long subsequent to the introduction of infection, and streptococci were occasionally isolated many months, or even years, after the acute process had subsided.

7. Gonorrheal pelvic infection primarily involves the tubes, with resultant thickening, induration, closure of the fimbriated ends, and pelvic adhesions which are amenable to separation by blunt dissection. Microscopically, the folds of the mucosa are found adherent, pockets of gland-like columnar epithelium extend deeply into the wall of the tube, blood vessels are numerous, and plasma cells are characteristic.

8. If the patient can be early isolated from the source of her infection, a single attack of gonorrheal salpingitis is usually borne without protracted clinical symptoms or severe pathological results. Greatly thickened tubes are most often associated with repeated exposures.

9. Implicit reliance should not be placed upon hematosalpinx as dependable evidence of tubal gestation. Hemorrhage may occur in greatly thickened gonorrheal tubes.

10. Salpingitis nodosa, although most frequently of gonorrheal origin, may be due to one of many causes, either inflammatory or non-

Digitized by Google

inflammatory; the microscope best explains the etiology of any doubtful case.

11. In streptococcus infection tubal involvement is usually but a part of the picture. Perisalpingitis is the most frequent type of tubal lesion. Even though there be an extensive salpingitis, the fimbriated extremities will very likely remain open; the mucous membrane folds, or "villi," of such tubes show few adhesions. On the other hand, with the less common occurrence of occluded fimbriæ and accumulated fluid within the tube, adhesions are present between the villi and there are nests of columnar cells in the tube wall; differentiation from the gonorrheal tube is then difficult.

12. Tuberculosis is very likely to be overlooked if routine histological preparations are not made. When limited to the pelvic organs it is difficult to establish a diagnosis from the gross appearance alone. Unusually resistant adhesions suggest tuberculous or streptococcus infection.

13. Somewhat similar operative measures appear indicated in streptococcus and in tuberculous salpingitis. In both diseases infection is not usually confined to the tubes; in both, viable bacteria are often still present in the tissues at the time of operation and there is danger of chronic postoperative infection of the ovaries. Particularly in regard to extirpation of the ovaries, more radical surgery appears indicated than in gonorrheal infections of corresponding severity.

14. The results of this work again direct attention to the dangers of uterine instrumentation. Nearly all streptococcus infections in this series were traceable to instrumental abortion or subsequent intrauterine manipulation; some tubal infections recurred after curettage; tent dilatation was followed by streptococcic pelvic abscess. It would appear that the normal uterus and fallopian tubes are comparable with an unopened tube of culture media; passage of instruments through the bacterial barrier of the internal os is analogous to removal of the cotton plug, and Nature is not always able successfully to combat infection before serious lesions have resulted. This is particularly true if infection which has been previously introduced is stirred up through subsequent instrumentation.

Digitized by Google

HEMORRHAGE FROM THE NONPREGNANT UTERUS IN THE ABSENCE OF A NEOPLASM

By William A. Scott, M.B.

Toronto, Ont.

(By Invitation)

A GREAT variety of terms have been used to describe the clinical phenomena of hemorrhage occurring from a nonpregnant uterus which is not the seat of a neoplasm. Climacteric hemorrhage and myopathic hemorrhage are two terms used from the clinical standpoint, whereas fibrosis uteri, chronic metritis, and arteriosclerosis of the uterus, are pathologic terms applied by other writers in the attempt to describe the clinical symptoms by a term descriptive of what they regard as the underlying pathologic condition.

The commonest of these terms in use today is fibrosis uteri, but it is one to which a great diversity of meaning is applied. Fletcher Shaw uses the term synonymously with chronic metritis and defines it as "a uterus symmetrically enlarged and hard, which contains no new growth and which produces hemorrhage, pain on leucorrhea, or any combination of these." Such a definition is a clinical, rather than a pathologic one. Furthermore, in all cases of idiopathic bleeding we do not find an enlarged or a hard uterus, some of them being small, atrophied, and of the senile type, others large and soft, large and hard, or normal in size.

The first scientific article on this subject was published by Scanzoni in 1860 and it was followed by another in 1863 in which he described two stages in the development of chronic metritis. The first stage he termed one of infiltration, with a large, soft uterus, due to hyperemia and edema and followed by a stage of induration, where the uterus was dry, hard, and anemic with vessels much reduced in caliber.

Seifert in 1866 and Saxinger in 1867 came to the conclusion that the bleeding was the result of subinvolution, while Finn asserted that the chief pathologic change was a hypertrophy of the muscle and the increase in fibrous tissue was negligible. Since that time there has been much debate whether the increase in size of these uteri was due to muscle alone, to muscle and connective tissue, or to connective tissue alone.

In 1870, curettage, as a treatment for hemorrhage, came into vogue and Olhausen placed the chief blame for the bleeding on the endometrium and septic endometritis came to be looked upon as the only

Digitized by Google

cause for metritis. This idea inevitably led to the idea of chronic endometritis which persisted until the work of Hitschman and Adler in 1908 disproved the occurrence of chronic endometritis except in very rare instances.

Fritsch, Cornil, Pozzi and Reinicke all published articles between 1885 and 1897 without making any great contribution but in 1902 Theilhaber and Meier elaborated the theory of "muscular insufficiency" and at the same time contended that any change in the endometrium was secondary to that of the myometrium.

Barbour came to the conclusion that the main pathologic change was one of arteriosclerosis, although he pointed out that such a condition after the menopause is seldom, if ever, accompanied by serious hemorrhage. Hermann, Martin, and Rustner all agreed with this view, but Palmer Findlay, in 1905, disagreed and went back to the idea of muscular insufficiency. He held that the common cause of this muscular insufficiency is the increase of connective tissue at the expense of muscle, a fibrosis uteri, and that the most important precursor of this change is passive congestion of the uterus from any cause. He also taught that a hyperplasia of the endometrium was secondary to a primary metritis. Addinsell in 1906 contended that there were three stages in the process: infiltration of both endometrium and musculature, then an intermuscular fibrosis, and finally a degeneration of this fibrous overgrowth. In the same year Gardiner and Goodall published a comprehensive report in which they stated that any prolonged congestion causes hypertrophy or hyperplasia of muscular as well as connective tissue and if this is sufficiently prolonged the muscle fibers atrophy and the connective tissue predominates.

Archibald Donald in 1907 opposed the idea that the changes were due to passive congestion and pointed out that the vascular changes are inconstant. He believed that the changes in the endometrium are constant and that hypertrophy of this mucous membrane causes a work hypertrophy of the musculature. In 1910 Goodall published another paper on "Climacteric Hemorrhage" in which he pointed out that the areas of so-called hyaline degeneration around the blood vessels, described by previous writers, if stained by Weigert's method, would prove to be elastic tissue and he believed that the causative factor was subinvolution of the uterus. He did not believe that infection alone, apart from pregnancy, could give rise to chronic metritis. In the same year Rabinovitz stated that the blood vessel changes are secondary to those of the muscularis, as proved by invasion of fibrous tissue in the adventitia. He believed that the cause of the condition is the fact that connective tissue does not undergo retrograde changes as fast as the muscular tissue after pregnancy.

Briggs and Hendry studied 104 uteri removed for uncontrollable

Digitized by Google

hemorrhage cases and in their opinion the muscular changes can be either the result of subinvolution or of hypertrophy. They could not demonstrate any constant increase in the amount of elastic tissue and found great variations in size, number, and distribution of the vessels. Their view was that uncontrollable uterine hemorrhage is a functional disturbance.

Fletcher Shaw has possibly written more on the subject of chronic metritis than any one else. He published papers in 1907 and 1914 on its pathology and his views were summed up in his excellent article in *The New System of Gynecology* edited by Eden and Lockyear and published in 1917. He found no constant blood vessel changes and concluded that the hemorrhage is not dependent upon such changes, but he also pointed out that the increase in the size and thickness of the uterine wall is a constant feature and is due to an increase of both muscle and connective tissue. The endometrium was found to be fairly constantly thickened. Shaw confined his study to uteri symmetrically enlarged and hard, most of which were the site of hemorrhage, but in a few of which the symptoms were leucorrhea or pain. He studied, therefore, a definite uterine change rather than the broader question of idiopathic hemorrhage, for we know that the latter may occur from uteri that are not enlarged and are not hard. He divides the cases studied into three groups: (1) Chronic metritis, meaning the late result of inflammation and comprising 1 per cent of the total. (2) A subinvolution group, comprising 95 per cent of the total and (3) a hypertrophy group, comprising 4 per cent of the total. In both the subinvolution and hypertrophy types the endometrium was thickened and the glands dilated and he describes the hypertrophy cases as due to the efforts of the uterus to expel this thickened mucosa.

E. H. Macdonald considered that essential uterine hemorrhage is an abnormality of menstruation and conceives of the latter as being due to an inhibition and then a contraction of the uterine musculature.

Novak, in 1917, and again in 1920, published very suggestive papers on "Hyperplasias of the Endometrium," in which he pointed out that there is much evidence in favor of the explanation of abnormal uterine bleeding being a perverted physiology of the menstrual mechanism. He pointed out that in these cases of functional bleeding a very common histological finding is a glandular hyperplasia of the endometrium. Novak stated that in his experience this condition of the endometrium is never found except when uterine bleeding has been a symptom, but it may be associated with other lesions that are in themselves producers of abnormal bleeding, such as fibroids. He thinks that a common factor, likely ovarian, accounts for both the bleeding and the hyperplasia.

Geist in his study of hemorrhage from the myomatous uterus as well

Digitized by Google

as from the uterus free from neoplasms, comes to the conclusion that the bleeding is purely functional and brings forward evidence that the causative factor is likely ovarian.

From the above summary of the literature it is obvious that the histological findings in cases of idiopathic uterine bleeding vary in the experiences of different observers and there is no one constant finding: also that most writers are agreed that the majority of the

Fig. 1.—Photograph of two bleeding uteri taken side by side for comparison of size. Symptoms the same.

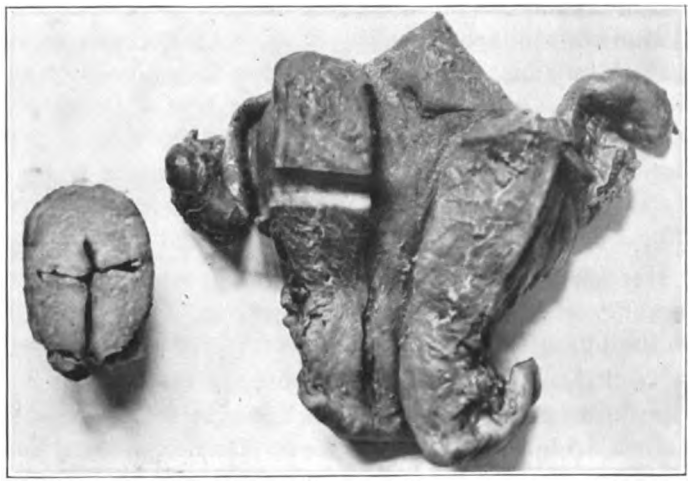


Fig. 2.—Photograph of two bleeding uteri taken side by side for comparison. The smaller uterus was so fibrotic it cracked from the pressure of a uterus holder used during operation.

cases are of the subinvolution type so well described by Goodall, in which the uterus is enlarged with a very thick wall and with both the muscular and fibrous tissue increased, although the relative proportion of these two tissues is about normal. The blood vessels are thick walled and there are large plaques of elastic tissue around many of them, the result of subinvolution. Most of the uteri that have been carefully studied histologically have been of this type, and having

Digitized by Google

made out these findings, it has been assumed that the bleeding depends upon them. But idiopathic bleeding also occurs from other types of uteri and it is not uncommon to find the small sclerotic uterus, or the large, soft and flabby one, bleeding just as profusely as the one that is typical of the so-called "fibrosis uteri." Moreover, it is possible to find many uteri exhibiting any or all of the described histological findings and yet not the seat of abnormal bleeding.

The series of cases that form the basis of this paper consisted of 126 specimens, all of which were stained by Weigert's method for elastic tissue and counterstained by Van Gieson's method for fibrous and mus-

Fig. 3.—Section from wall of uterus that was bleeding excessively. Patient's age 48. Para vi. Uterus enlarged, with thick walls. Vessels are enlarged and thick-walled and contain an excessive amount of elastic tissue.

cular tissues. Of the total number, 92 were the seat of idiopathic bleeding and 34 were either not bleeding at all or were having normal menstruation. Let us consider the bleeding cases. Of these, 62 had the gross characteristics of the so-called fibrosis uteri. The walls were much thicker than normal and the blood vessels stood out from the cut surface as firm projections. Each uterus was considerably enlarged, was very firm in consistency, and the myometrium was streaked and mottled by what appeared to be strands of fibrous tissue. But there were also 16 of the bleeding cases in which the uterus was smaller than normal but firm in consistency. Finally there were 14 cases in which

Digitized by Google

the uterus was normal in size. Fig. 1 is a photograph of one of the large and one of the small uteri taken side by side for comparison. Fig. 2 is a similar case where the small uterus was so fibrous that the pressure of a uterus holder, used during the operation, was sufficient to crack the wall.

Not only are the gross appearances inconstant in these cases of bleeding, but the microscopic findings also vary greatly. The estimation of the normal proportions of fibrous tissue and of muscle in the wall of the uterus is a matter of individual judgment, but these specimens were stained to bring out the two tissues sharply, and in my estima-

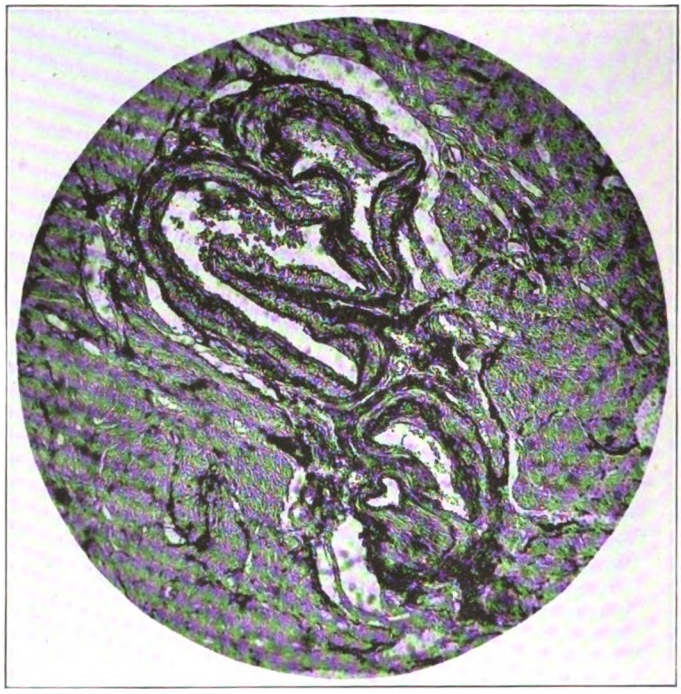


Fig. 4.—Section from the wall of an enlarged, hard uterus removed for prolapse. Menstruation was normal and there was no evidence of pelvic inflammation. Patient's age 34, para ix. Vessels are very thick-walled and contain an excess of elastic tissue. Microscopical findings are those of "fibrosis uteri," yet there was no bleeding.

tion, out of the 92 bleeding cases, there was an increase in the proportion of fibrous tissue in the uterine wall in 34 cases, while there was less than the normal proportion in 2, and in the remaining 56 cases the proportions of muscle and connective tissue were normal. The appearance of the blood vessels was also inconstant. They were markedly thickened in 24 specimens, though the situation of these thickened vessels varied, in some instances being just under the mucosa and in others being found only in the deeper parts of the myometrium. In 34 specimens of bleeding uteri the vessels contained an excessive amount of elastic tissue or had masses of this tissue out-

Digitized by Google

side their walls, while the remaining 56 cases had vessels microscopically normal.

In view of the inconstant gross and microscopic findings in these cases of idiopathic bleeding, it appears improbable that the bleeding is actually caused by any one of these changes in either myometrium or vessels. This opinion is strengthened by a consideration of the 34 cases studied where the uterus was not the seat of excessive bleeding but was removed in the course of operation for prolapse or inflammatory disease. In this group 18 specimens were larger than normal, 6 specimens were smaller than normal and 10 were of normal size.

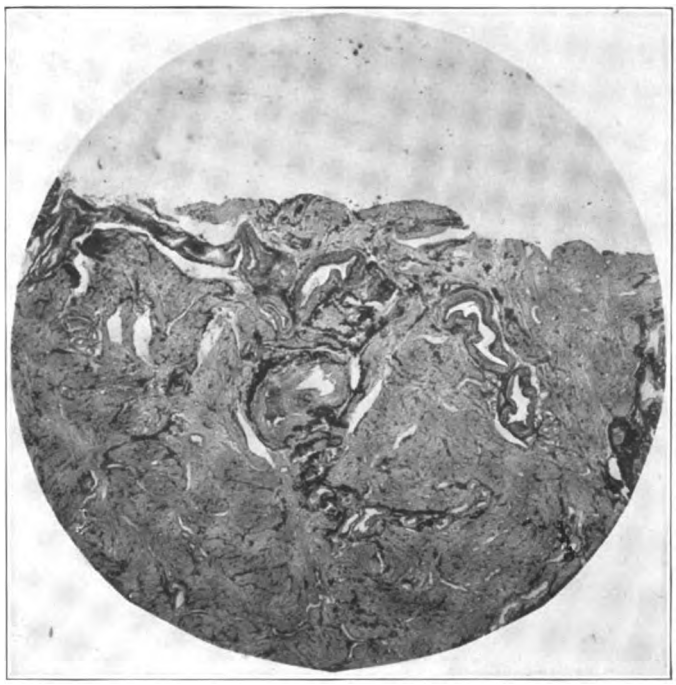


Fig. 5.—Same specimen as Fig. 4. Further illustration of the findings of "fibrosis uteri" without bleeding.

The microscopic findings varied as much as in the bleeding cases. There was an increase in the proportion of fibrous tissue in 20 cases and the proportion was normal in 14. The blood vessels were thickened in 24 specimens while in 16 they contained an abnormal amount of elastic tissue, either in the wall or just outside the wall. The vessels were normal in 8 instances.

We see then, that the histological findings of chronic metritis or fibrosis uteri, are not present in all cases of idiopathic uterine hemorrhage but, on the other hand, are found in a fair proportion of cases where there is no abnormal bleeding. This is illustrated by Fig. 3, which shows a section of wall from a large, hard, bleeding uterus, and

Digitized by Google

Figs. 4 and 5, which are sections from the wall of an enlarged uterus that had never shown any excessive or irregular bleeding. In both cases there are thick-walled blood vessels containing excessive amounts of elastic tissue, yet one uterus was bleeding excessively, the other was not. Fig. 6 shows a normal myometrium and normal vessels from a uterus that had severe and irregular bleeding. Fig. 7 shows a uterus that was very hard, smaller than normal, and had a myometrium containing a very large proportion of fibrous tissue but without any excessive bleeding. Fig. 8 shows these results in tabular form.

There was one histologic finding, however, that was more constantly

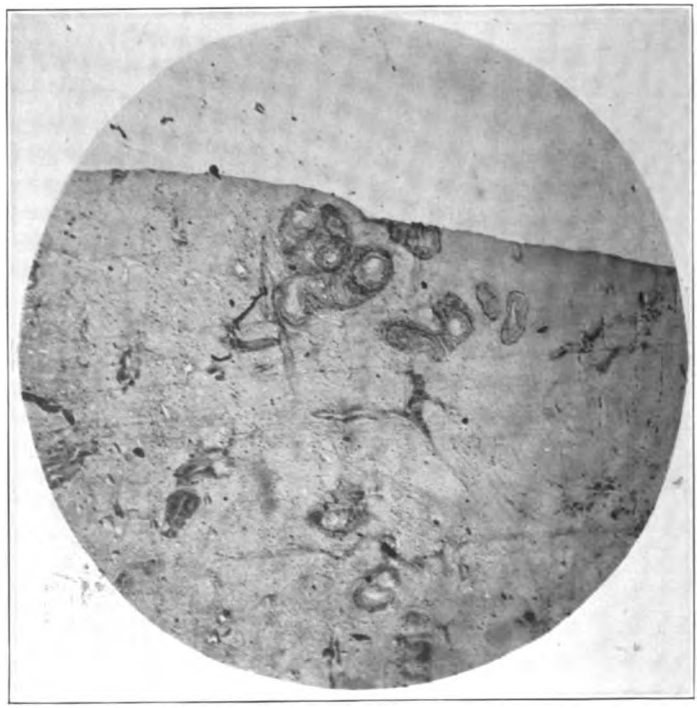


Fig. 6.—Normal vessels and myometrium from a normal sized uterus that was the site of very severe hemorrhage.

present in the bleeding cases than any other and that was a glandular hyperplasia of the endometrium. In the great majority of these cases the endometrium was much thicker than normal, though this is not always true. The glands are greatly increased in size and in number and large glands are often present just under the epithelium. Usually the stroma is also increased in amount and very cellular, but in other cases the picture is almost wholly one of glandular overgrowth with the appearance of an exaggerated, premenstrual activity. This condition is not found in all bleeding cases, but is present in a large proportion, 64 out of the 92 bleeding specimens examined showing it. I have yet to find a typical case of hyperplasia of the endometrium

Digitized by Google

unaccompanied by bleeding and, as Novak has pointed out, it is frequently found in cases of a neoplasm, such as a fibroid or an adenomyoma, if the patient is suffering from bleeding.

If, then, there be no constant histologic findings in cases of idiopathic uterine hemorrhage, and the bleeding does not depend upon changes in the myometrium or in vessels, how is it to be accounted for? In the absence of positive proof of its causation there are certain considerations that point to its being due to some aberration of the endocrine glands. In the first place, idiopathic hemorrhage occurs only during the menstrual life of the patient and practically always

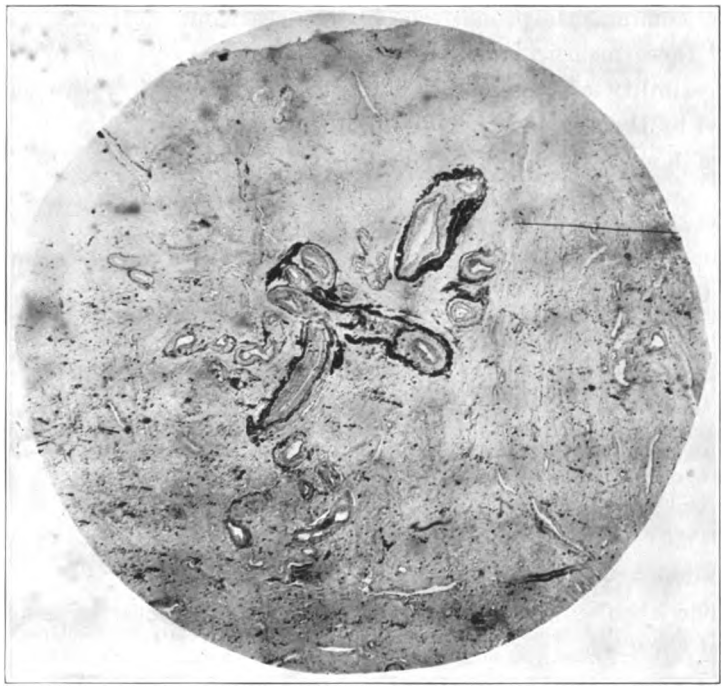


Fig. 7.—Section from wall of uterus smaller than normal and very hard. No irregular bleeding. Age 38, para iii. There is great increase in the connective tissue and the vessel changes are those of subinvolution.

starts as a menorrhagia, though it may develop into a metrorrhagia. Secondly, it occurs most frequently near the time of puberty or the menopause, and this is also the time when the action of the endocrine glands is most frequently abnormal. Thirdly, the condition sometimes clears up spontaneously and a normal menopause or menstrual history follows. Fourthly, certain ovarian conditions, such as lutein cysts, are commonly associated with both bleeding and glandular hyperplasia of the endometrium. Finally, the condition can be cured by x-ray or radium therapy, and the action of these substances is primarily on the ovaries.

Digitized by Google

Treatment, however, must be directed against the bleeding uterus, rather than the underlying endocrine disturbance. At least this is so during the present state of our knowledge regarding endocrine therapy. There are two methods of treatment that today yield satisfactory results; one is surgery, and the other is the employment of the x-ray or of radium. Proper surgical treatment consists of a subtotal hysterectomy, after the possibility of cancer of the body of the uterus has been eliminated. A few of these cases recover after repeated curettage, but their number is so small that such a form of treatment is not advisable. More and more, however, is the use of the x-ray, or radium coming into prominence in the treatment of these cases. The use of these measures demands a preliminary curettage to eliminate the possibility of cancer, but once that is done, they can safely be treated by the use of either of these substances, with almost certainty of cure in every case.

	92 BLEEDING CASES	PER CENT	34 NONBLEEDING CASES	PER CENT
Large Uteri	62	67.3	18	52.9
Small Uteri	16	17.3	6	17.6
Normal Size	14	15.2	10	29.4
Increase in fibrous tissue	34	36.9	20	58.8
Normal fibrous tissue	56	60.8	14	41.8
Less than normal	2	2.1	0	0
Thick-walled vessels	24	26.0	24	70.5
Normal vessels	56	60.8	8	23.5
Excessive elastic tissue	34	36.9	16	47.0

Fig. 8.

To summarize, therefore, the above points:

1. The histologic findings in cases of idiopathic uterine hemorrhage are not constant.

2. In the majority of cases, the uterus is enlarged, hard, and thick-walled, and contains an excessive amount of elastic tissue: the result of subinvolution.

3. But bleeding does occur in some instances, from uteri which do not show the gross or microscopic findings of subinvolution.

4. Not only may bleeding occur without these findings, but furthermore, the histologic picture of fibrosis uteri may be present without any abnormal bleeding.

5. The most constant histologic finding in bleeding cases, is one of glandular hyperplasia of the endometrium.

6. This glandular hypertrophy and the bleeding are likely due to a common factor, which is probably ovarian.

7. Treatment is preferably by means of x-ray or radium.

Digitized by Google

BIBLIOGRAPHY

(1) Shaw, W. Fletcher: Transactions of Obstetrical Society, London, 1907, xlix. (2) Gardner and Goodall: Brit. Med. Jour., Nov., 1906. (3) Palmer and Findley: Am. Jour. Obst., 1905, lii. (4) Donald and Shaw: Roy. Soc. Med. (Obst. Sect.), 1911, iv, 37. (5) Whitehouse, Beckwith: Roy. Soc. Med (Obst. Sect.), 1914, vii, Part 2, p. 123. (6) Briggs, Henry, and Hendry: Roy. Soc. Med. (Obst. Sect.), 1914, vii, Part 2, p. 195. (7) Donald, Archibald: Roy. Soc. Med. (Gynec. and Obst.), 1914, vii, Part 2. (8) Shaw, Fletcher: Roy. Soc. Med. (Obst. and Gynec.), 1914, vii, Part 2, 360, 1914. (9) Bonning: Roy. Soc. Med. (Obst. and Gynec.), 1910-11, Part 2, p. 274. (10) Wittick: (Abstract) Jour. Obst. and Gynec., Brit. Emp., x, 384. (11) Addinsell: Jour. Obst. and Gynec., Brit. Emp., 1906, x, 6. (12) Barbour: Jour. Obst. and Gynec., Brit. Emp., June, 1905, vii, 387. (13) Novak: Am. Jour. Obst., 1917, p. 996. (14) Goodall: Am. Jour. Obst., 1910, lxi, 32. (15) Rabinovitz: Am. Jour. Obst., 1910, lxi, 51. (16) MacDonald, E. H. B.: Jour. Obst. and Gynec., Brit. Emp., xi. (17) Donald, Archibald: Jour. Obst. and Gynec., Brit. Emp., Feb., 1917. (18) Eden and Lockyear: New System of Gynecology, B. P. Watson, ii. (19) Novak, Emil: Jour. Am. Med. Assn., July 20, 1920. (20) Geist, S. H.: Surg. Gynec. and Obst., Oct., 1915, ibid., July, 1916.

DISCUSSION

DR. JOHN A. SAMPSON, ALBANY, NEW YORK.—I think Dr. Scott's paper is a valuable contribution in showing that there is no constant histologic change to account for such bleeding. We appreciate that bleeding from the uterine cavity, in the absence of a new growth, indicates, in the first place, some injury to the endometrium, and second, that the musculature of the uterus is not sufficiently contracted to shut off the venous channels which convey the blood from the venous endometrial plexus to the deeper plexus in the uterine wall. That is very well brought out in connection with curettement of the uterus. When we curette the uterus we remove endometrium, and while there is relaxation there is profuse hemorrhage from the cervix. Afterwards, even though the endometrium is still removed, provided the uterus is contracted, bleeding does not occur, so that I think we must look upon many of these cases of uterine bleeding, whatever the cause may be as due to something which prevents in some way the normal contractility of the uterus by which it can properly control its venous circulation. As long as the uterus contracts, it is impossible for the venous blood to escape into the uterine cavity, and it is venous blood that escapes.

DR. WILLIAM S. STONE, NEW YORK CITY.—I have studied this condition carefully in the laboratory, and I can confirm the statement Dr. Sampson has just made. The only condition in the uterus that seems to be at all constant is the relative disproportion of the muscle and fibrous connective tissue. That was not altogether constant, but the most constant histologic feature I was able to determine. I have always thought the muscle insufficiency as it is developed more or less accounted for the bleeding, and it accounts for the bleeding also in those rather infrequent cases in young women as well as in the older.

DR. CAREY CULBERTSON, CHICAGO.—From the abstract of Dr. Scott's paper given in the program, I infer that he regards the origin of this hemorrhage as probably ovarian. There is much evidence that the bleeding is due to ovarian dysfunction, whatever that means, but I firmly agree with Dr. Sampson that flaccidity of the uterine wall, which he brought out so well in his work on fibroids, is largely accountable for the hemorrhage. Whether this lack of tone is present when these organs bleed, hence due to organic fault, or whether a functional disturbance of the ovary exists unfortunately cannot be demonstrated by section of the postmortem tissues. The whole subject brings up the treatment, which today is provided for in a variety of ways. Should the uterus be taken out since we have radium? These hemorrhages have been stopped temporarily by radium. Many of

Digitized by Google

these menstrual disturbances can be corrected very nicely by endocrine treatment. I have given extract of the whole pituitary body in two grain doses in some of these cases where the uterus seemed to be clinically normal, with very satisfactory results.

DR. SCOTT, (closing).—I can only bring out the one iconoclastic point which is my opinion, namely, that none of the local histologic findings in the uterus can be taken as the ultimate cause of this type of bleeding. It is my own opinion that the cause of the bleeding is endocrine, likely ovarian, and I quite agree with what the last speaker (Dr. Culbertson) said, that more and more we are going to get away from surgery in the treatment of these cases. A few of them respond to endocrine treatment, but that must be regarded as more or less empiric. The use of whole pituitary body is sometimes successful, so is sometimes the administration of thyroid, but one can with absolute assurance guarantee the patient a cure in these cases by the proper use of either radium or x-ray, and it makes no difference which is used. One can get just as successful results from the use of one of these agents as from the other. Of course we must eliminate the possibility of neoplasm in the body of the uterus. In the last year and a half in the service with which I am connected, we have treated nearly all these cases by the use of the x-ray as we did not have sufficient radium at that time.

Digitized by Google

OVULATION AND MENSTRUATION AS POSTOPERATIVE CONSIDERATIONS

By Thomas J. Watkins, M.D.
Chicago, Illinois

IT IS not my purpose to discuss this subject in detail as it has been well done by others, especially by our Fellows, Graves[1] and Richardson,[2] but it is my intent to consider some practical features based chiefly upon personal observation.

Ovulation and menstruation as postoperative considerations are important because many of the pelvic operations affect these functions. The great diversity of opinion which exists relative to their importance is unfortunate as it frequently affects surgical judgment and must at times result in detriment to the patient and always in confusion to the student. The extensive studies of the endocrines which have been made and the vast amount of clinical data which has been acquired have added so much to our knowledge of the ovary that this continued state of confusion is not justified. Much of the difficulty is attributable to carelessness in recording and utilizing clinical data and to the fact that clinical research cannot be verified by "control" cases. The so-called "open mind to conviction" is so often mistaken for a mind of fixed opinion,—roofed, sided, and continuously calked to prevent leaks,—as to materially retard progress. A fixed opinion fails to be interested in, to observe, or to note conditions which cannot be utilized for calking purposes.

OVUM AND CORPUS LUTEUM

The problem of the ovary relative to operative indications concerns the production of ova and ovarian secretion. Unanimity of opinion exists relative to conservation of the ovary when conditions obtain which are favorable to reproduction. Opinions vary much in regard to conservation of the ovary for secretion. The ovarian secretion during menstrual life has been proved to be an important part of the endocrine system. The physical changes that take place in the body at puberty and the menopause emphasize the importance of ovarian function. The usual good health which obtains after the menopause is completely established demonstrates the ability of the endocrine glands to compensate for the loss of ovarian secretion. Is there any objection to the production of a premature menopause exclusive of

Digitized by Google

the possibilities of reproduction? The individual most concerned, woman, would generally answer in the affirmative. This opinion for psychologic reasons, aside from other considerations, demands recognition. It is impossible to estimate the relative severity of the neuroses of the artificial and natural menopause because "control" investigation is not possible, and because individual cases vary so much. My personal observations induce me to believe that the difference is negligible.

The problem of atrophy following the menopause is the one of greatest biological importance. Atrophy following the artificial is no more than after the natural menopause, but the latter is beyond our control. More or less atrophy necessarily follows loss of ovarian function, as growth and sustained growth require function. The loss of one lessens the other. Loss of the ovarian function necessarily causes atrophy in the tissues associated with it in function. Cases are occasionally seen of such extensive postclimacteric atrophy as to cause great physical discomfort and distress from fissures, erosions and irritating leucorrhea. Although the severe cases are infrequent, the others are of sufficient importance to demand serious consideration.

CONSERVATION OF THE OVARY IN UTERINE FIBROIDS

No clinical or theoretical evidence indicates that excision of the fibroid uterus compromises the life or function of the ovaries unless they are so situated that the operation disturbs their blood or nerve supply. The menopause symptoms following hysterectomy with conservation of the ovaries, appear about the usual time. The ovaries also remain normal in size, determined by conjoined palpation. These observations are based upon an experience extending over some years of leaving the ovaries in favorable cases when excising the fibroid uterus.

We have had no instances that raised the suspicion of an increased liability of such ovaries to disease. I have no personal record of ovarian cysts developed in ovaries left after fibroid operations. It is reasonable that they should occur, but it has not been my experience to see them.

Observations in the treatment of small uterine fibroids with radium has induced us to generally limit the use of radium to cases past forty years of age; in younger women supravaginal hysterectomy has seemed preferable to destruction of the ovary by radium. The fact that with radium profuse bleeding occasionally occurs before amenorrhea is established, and that cessation of menses and arrest of growth is often temporary in younger women, is additional evidence in favor of supravaginal hysterectomy in such cases.

Digitized by Google

CONSERVATION OF THE OVARY IN SALPINGITIS

The same evidence for and against conservation of the ovary in fibroids is applicable in case of salpingitis, except in salpingitis the cortex of the ovary is modified by inflammatory reaction. We have followed other surgeons in a gradual change from radicalism to conservatism of the ovary in salpingitis, as the importance of the functional value of the ovary has been developed. This experience has convinced us that sufficient ovarian structure can and usually should be left to conserve ovarian secretion. In the very severe cases of infection enough ovarian stroma is fortunately at times left incorporated in adhesions to functionate. Authentic cases are on record of the occurrence of pregnancy in such cases. Acute ovaritis, that occasionally follows salpingectomy, may result in considerable distress, may persist for some weeks, but will generally subside and cause no further trouble if treated with time, patience and encouragement.

Tradition and some other influences have developed very different surgical judgment for the male and female sex glands, although their function and diseases are somewhat similar. Enlarged prostates and uterine fibroids are analogous structures. Gonorrheal infection, pus tubes and sex gland contamination appear in man and woman. The sex discrimination in the surgical treatment of these diseases does not appear justified.

The following case illustrates the sex discrimination which exists even among the laity:

A husband and wife recently requested the operation of removal of the ovaries to prevent pregnancy. They were informed that sterility could be easily and safely obtained by a minor operation upon the husband. They were anxious to have the ovaries removed, but refused any operation upon the husband. There is a suspicion that our profession is not entirely devoid of this sex discrimination. Excision of the testes for enlarged prostate was never a popular operation. I recall a few instances of this operation performed on nonmedical men.

NONCONSERVATION OF MENSTRUATION

Conservation of menstruation has no value aside from its relation to reproduction. Menstruation is a handicap Nature seems to have been obliged to impose upon woman for the accomplishment of pregnancy. It is part of the means of recovery of the uterus from the sorrow over the loss of the ovum. Menstruation is a menace to health and hygiene except for the purpose of reproduction. Absence of symptoms during the physiologic amenorrhea of pregnancy and lactation, and after amenorrhea following hysterectomy when normal ovaries are present,

Digitized by Google

proves that menstruation has no functional value except in relation to reproduction. The handicap varies much, depending upon the amount of loss of blood and of systemic and pelvic distress. There is abundant clinical evidence that absence of menstruation, after removal of the body of the uterus, does not compromise the life or function of the ovary.

Experience has convinced me that menstruation should be abolished by excision of the body of the uterus in the course of abdominal pelvic operations when conditions obtain which make pregnancy impossible or inadvisable.

Our records show that operations for retrodisplacement of the uterus have become infrequent, generally not more than two or three a year. The uncomplicated cases are usually not operated; the operated cases generally have enough pathology to indicate supravaginal hysterectomy. Suspension of a heavy hyperplastic denuded uterus, especially if accomplished by menstrual disturbances, usually gives unsatisfactory results and not uncommonly necessitates subsequent abdominal section, which is always distressing to the patient, disappointing to the operator, and discrediting to surgery.

An abdominal section, that sacrifices by hysterectomy a poor chance for pregnancy, is preferable to one not sufficiently radical to give good assurance of cure. This type of cases demands that the operator have the clinical history well in mind at the time of operation, as individual surgical judgment is obligatory.

Conservation of menstruation should not be considered in fibroid tumors except in rare instances. My records of myomectomies have been very disappointing, menstrual disturbances have generally recurred, fibroids have often developed and most of them have required subsequent excision or radium. This result would be expected, as myomectomy does not remove the cause of the growth or the place of development, and is generally an incomplete operation. I question its justification without advising the patient of the probabilities in prognosis.

There is a small group of women, a rather distinct type, that reminds one of Lincoln's Mississippi River boat. This boat was so badly constructed, that when it blew its whistle the boat stopped; when the boat was running it could not blow its whistle. This small group above referred to are so delicately constructed, that when they menstruate they are otherwise entirely incapacitated. They are the type of women for whom Battey[3] devised his operation of removal of normal ovaries and tubes to abolish menstruation. If supravaginal hysterectomy had been developed in Battey's time, he would have excised the whistle instead of the generator, and his operation would have lived and flourished. When this type of woman has a condition indicating abdominal

Digitized by Google

section, menstruation should be abolished by excision of the body of the uterus. I refer especially to a group of cases who suffer from headaches, nausea, vomiting, pelvic pain or hemorrhage, or a composite of all these, and who are free from menstrual disturbances for only one or two weeks each month.

REFERENCES

(1) Surg., Gynec. and Obst., 1917, xxv, 315. (2) Tr. Am. Gynec. Soc., 1918, xliii, 114. (3) Tr. Am. Gynec. Soc., 1887, xii, 253.

Digitized by Google

RADICAL CONSERVATISM IN THE SURGICAL TREATMENT OF CHRONIC ADNEXAL DISEASE

By Frederick C. Holden, M.D.
New York, N. Y.

CONTRARY to the usual custom of a quarter of a century ago, the present practice is for the conservation of ovarian function whenever possible. Too frequently this desire has been fraught with disaster, necessitating a subsequent operation on account of cystic and painful ovarian tissue. If ovaries are to be conserved and functionate and not cause distress, it is important that adequate afferent and efferent circulation be maintained. The removal of a normal or slightly inflamed tube may be accomplished with little interference with the circulation of the ovary, but it is impossible to remove a grossly enlarged tube, without interfering with that circulation.

It was with this idea in mind, that the operation about to be described has been performed on twelve patients, between November 22, 1919, and November 17, 1920, on the Gynecological Service of Bellevue Hospital. This is a preliminary report, as the number is too small and the elapsed time too short, to permit of positive conclusions. The average age was twenty-three years and eight months, oldest twenty-nine, youngest twenty. All had normal temperatures and normal leucocytic counts for at least three weeks prior to operation and were suffering from the usual symptoms of chronic pelvic inflammatory disease, which a rest period and local treatment had failed to relieve and which demanded operation for the relief of symptoms.

As to the operation itself, after severing adhesions, the inflammatory mass is brought into view, and is inspected to determine to what extent the diseased tissue shall be retained. Where one tube or ovary is apparently normal, and the other side the seat of a pyosalpinx, the diseased tube and the ovary are removed. There seems to be no justification for the retention of adnexa which are the seat of tuboovarian abscess.

The operation consists in the incision of the pyosalpinx along its anterior surface, from the clubbed end to the uterine cornua, which is best done with a sharp pointed, straight scissors. After a culture specimen is taken, the tube is wrapped in a hot, wet pad, while the other side is similarly treated. The bleeding of small severed vessels is controlled by fine suture ligatures. The incised tubes are so sus-

Digitized by Google

pended to the round ligaments by three or four interrupted fine linen sutures, as to turn the raw surface of the incised tubes downward. The ovaries are suspended (Pool method) by drawing the peritoneum away from the side of pelvis and a fine linen suture is passed, uniting it with the peritoneum of the infundibulopelvic ligament, just as it reaches the ovary. The uterus is then suspended. The choice in this

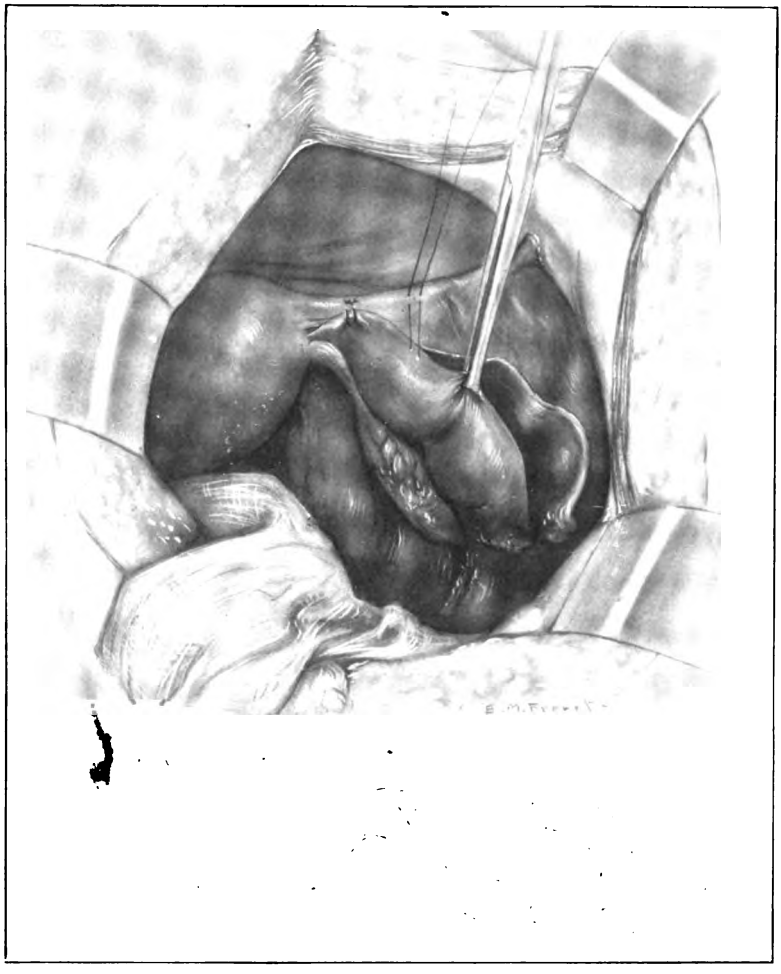


Fig. 1.

class of cases has been the Olshausen operation. Thus it will be seen that the retroverted uterus with its adnexa is freed, the tube or tubes incised and all so suspended that there is no chance that they can subsequently reach the culdesac.

The first case was drained through the vagina, the remainder closed without drainage. Cultures in all cases were negative. Each patient

Digitized by Google

made an uneventful recovery with about the same postoperative morbidity which accompanies radical operations for similar pathologic lesions.

Follow-up Notes.—From the standpoint of postoperative care, the type of patients in this short series is obviously the very worst, inasmuch as most of them are women of the streets, and it has been impossible to alter their mode of living after leaving the hospital.

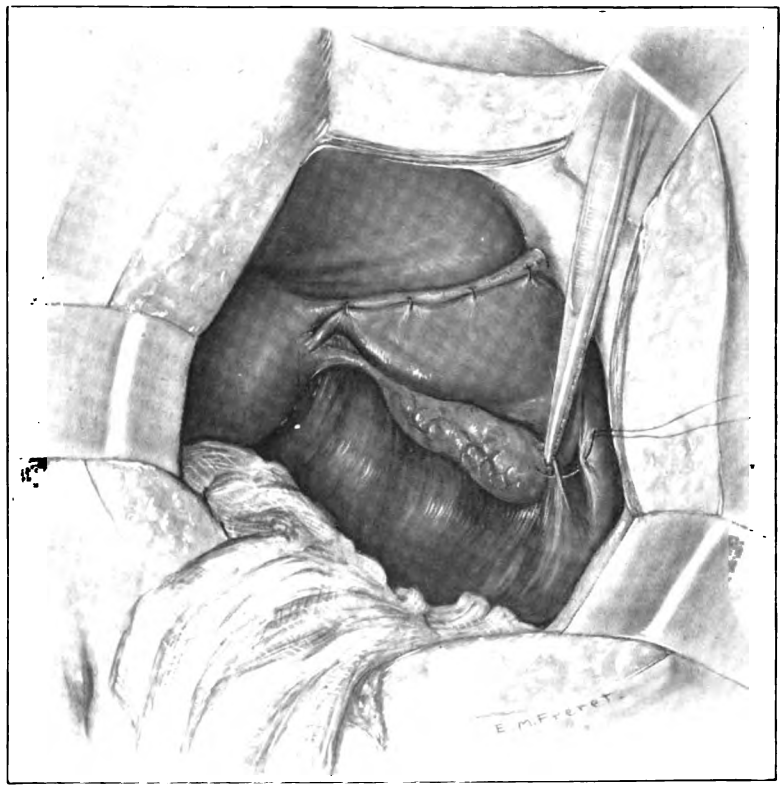


Fig. 2.

All traces of three have been lost, but nine have been examined one or more times since leaving the hospital. Two have reentered the hospital after the operation with symptoms of acute exacerbation of chronic adnexal disease and which were relieved by the usual treatment for acute salpingitis. In all those examined it has been possible to palpate the conserved tubes, which were not specially tender. Five of the nine were free from pain, and four had pain of varying degree in one or both sides, which did not incapacitate them.

Digitized by Google

CONCLUSIONS

1. It has been demonstrated that pyosalpinges may be incised and suspended without mortality or excessive morbidity.

2. A young woman with chronic adnexal disease, when physically disabled, and not responding to several weeks' rest and treatment, should be offered a choice between radical operation with its surgical menopause, and conservation with its possibility of reoperation.

3. In the event of conservation of ovarian tissue being decided upon, the technic described in this paper may be of benefit.

Digitized by Google

THE DISPOSITION OF THE UTERUS FOLLOWING SALPINGECTOMY WHERE IT IS DESIRABLE TO PRESERVE MENSTRUATION

By Carey Culbertson, M.D.
Chicago, Illinois

IT IS not desired to open the question as to the advisability of preserving menstruation, but rather to limit the contents of this paper to a discussion of the disposition of the uterus where the tubes have been removed and where it is possible to preserve some ovarian tissue. I am firmly convinced that it is an advantage to maintain menstrual function, particularly where the patient is young and has not borne children. The menstrual function is one of the features of normal health, and anything which tends to preserve normal health is desirable in the cure of pelvic disease in women.

Our present knowledge of the physiology of the uterine mucosa leads us to regard menstruation as a retrograde process, a mere bleeding out of a structure that has become edematous and highly vascularized. Inasmuch as this vascularization indicates a high stage of function on the part of a lymphoid structure such as the corpus mucosa is, we must regard the premenstrual edema as the expression of function rather than the actual hemorrhagic phase. Without ascribing to the corpus mucosa the importance of a ductless gland, we cannot say until we know more regarding the importance of specific cellular activity, that its function is of no value.

While the tubes are removed for a variety of lesions, in the great proportion of cases their removal is indicated by inflammatory disease which has destroyed them as oviducts and which is so extensive as to make it reasonably doubtful that their function can be restored by operative procedure. That this operation is indicated chiefly in young women is due to the fact that it is chiefly in young women that the infectious processes destroying the tubes are acquired.

In 518 cases tabulated according to age, on which this argument has been prepared, 321, or 62 per cent, occurred between the ages of eighteen and twenty-nine; between the ages of thirty and thirty-eight, 139, or 27 per cent, of these infections occurred. Before eighteen and after thirty-eight the number of cases was relatively negligible, though they varied from fifteen years to fifty-two years of age.

The preservation of the uterus, too, depends, as has been intimated, upon ovarian conservation and upon a second factor, that is, a uterus

Digitized by Google

that is not too badly diseased. Uteri which contain multiple fibroid tumors or which are suppurative in themselves are to be sacrificed in the great proportion of the cases.

The series referred to consists of 518 cases of general pelvic peritonitis involving the tubes which were treated by abdominal section. In this series both tubes were removed 445 times; one tube was removed 52 times; and both tubes were left in the remaining 21 cases. Of these 445 cases wherein both tubes were removed, hysterectomy was performed 199 times, leaving 246 cases, or 55 per cent, wherein some disposition *in situ* had to be made of the uterus.

In a survey of this material we may discuss four possibilities.

First, the uterus may be left alone. In my experience this is rarely applicable. In the first place, the uterus is often already displaced, either as a result of the diseased condition for which the operation is performed or as the result of some other pre-existing factor. Of the 518 cases referred to, the uterus was retroverted 199 times, or 38 per cent. It was fixed in retroversion 150 times and it was free 45 times. In 10 of these cases the uterus was in first degree and in 3 cases in second degree procidentia. The uterus was upright in 319 instances, fixed in 266, and free in the remaining 53. The removal of the tubes, therefore, and the breaking up of the adhesions so often weakens the broad ligaments that the uterus, even where it is already upright, is left in a condition of mobility, as a result of which it would be reasonable to expect it to become retroverted. Besides this, the uterus is in nearly every case involved in some degree of metritis, as a result of which it is enlarged, soft and boggy. This change is most evident, as Bell has pointed out, in its upper portion, so that even where it is upright prior to operation this condition provides another factor for bringing about subsequent retrodisplacement. Further, the menstrual disturbance which so often characterizes pelvic peritonitis is most apt to persist where retroversion is permitted. Therefore, in the large number of cases in which the uterus is already retroverted I do not believe it is desirable to leave it in such a position. It is true that retroversion of the uterus *per se* does not always bring about pathologic changes in the organ itself, but such displacement is a certain factor in the production of pathologic conditions, such as pelvic varicosities, ovarian congestion, procidentia, and of symptoms such as pain in the pelvis, backache, bearing down, and hemorrhage. Furthermore, particularly in pelvic peritonitis, it is desirable to leave the pelvis free from all raw peritoneal areas after the removal of the tubes, and the peritoneal surface of the uterus is in nearly every instance so involved as to defeat the purposes of peritonization. It is true that in a few cases the uterus may be so free from adhesions, so movable, so small, and in such a normal position with such excellent tonicity of its liga-

Digitized by Google

ments that it may be left without any particular procedure being employed to maintain it where it should remain, but it is equally true that in the great majority of cases such circumstances do not obtain, and it is, therefore, necessary to undertake some procedure aimed at maintaining the uterus in its normal relation to the other pelvic structures.

The *second* method of treating the uterus consists in some method of

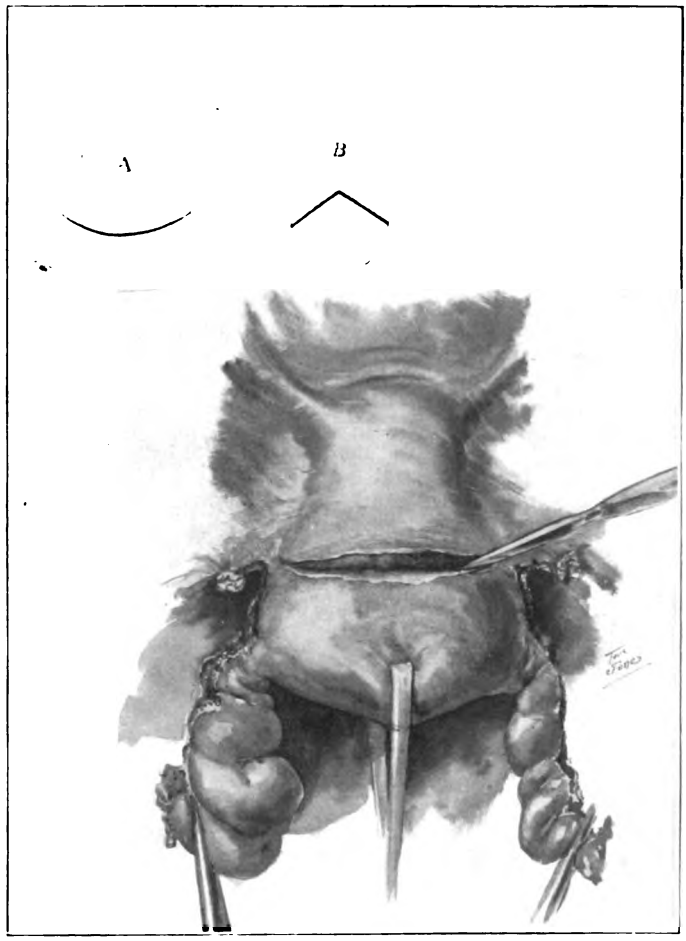


Fig. 1.*—The tube masses have been freed and are held up with the fundus of the uterus from which the round ligaments have been ligated. The fundus of the uterus is being amputated. *A.* The line of amputation—anterior and posterior wall. *B.* Line of amputation from a lateral aspect.

round ligament shortening. I have long been of the opinion that shortening of the round ligaments should be reserved for cases where pregnancy is to take place in the future, that is, in simple retroversion where the tubes are not diseased or where but one tube has been re-

*This and the following illustrations are from an article by the author, published in The Surgical Clinics of Chicago, W. B. Saunders Co., October, 1919, iii, No. 5, p. 1290.

Digitized by Google

moved. In the series of 518 cases just referred to, one tube was left 52 times; both tubes were left 21 times. Round and uterosacral ligament shortening was resorted to 52 times, either for the purpose of replacing the uterus where it had been retroverted or of covering raw areas on the uterine wall. Shortening of the ligaments as a means of overcoming retrodisplacements of the uterus, regardless of the method employed, is attended by a certain percentage of failures. In ligament shortening we are merely doing the best we can with the material at our disposal and this material is not always of the best quality. The ligaments are lax and attenuated or at times infiltrated and not readily freed. In addition, ligament shortening is poorly employed where the uterus is metritic, or where it is enlarged as the result of general fibrosis or of the presence of fibroid tumors. Fibrosis was present in 54 of the 199 uteri removed, and fibromyomata in 80.

The *third* method of disposing of the uterus is the one that is probably the most generally employed throughout the various surgical clinics of this country. I refer to ventral fixation, where the fundus of the uterus is fastened to the anterior abdominal wall by some method or other. This procedure leaves the uterus relatively immobile in a position that is abnormal. It forms a pillar in the lower mid-abdomen, renders peritonization difficult or impossible, and like the other two methods it requires that the entire uterus be left except for such portion of the cervix as may have been dealt with by plastic operation. Here again the metritic uterus responds poorly to such treatment, fibromata and fibrosis contraindicate the procedure and the menstrual disturbances are apt to persist. It is safe to say that secondary operation for removal of the uterus more often follows ventral fixation than any of these other procedures.

The method which the writer favors or wishes to emphasize at this time consists in the removal of the entire fundus of the uterus, a procedure which leaves a small organ that can be entirely covered by peritonization and which leaves the organ in its normal position, capable of maintaining menstruation in a degree sufficient to satisfy the physiological and psychologic requirements and at the same time not be subject to subsequent excessive bleeding. Such an operation was described in 1913 by Blair Bell and about the same time by Buettner. Buettner's operation is based on the principle inculcated by Fauré, that operation upon the adnexae should be from the midline toward the pelvic wall. After first ligating to prevent hemorrhage but leaving the round ligaments attached, Buettner excises the fundus uteri by transverse wedge-shaped incisions, the wedge being split mesially and each piece freed from its broad ligament. The wound in the uterine cavity is then sutured. The fallopian tubes were removed from below upward and from within outward. The parietal

Digitized by Google

peritoneum from the anterior abdominal wall or from the urinary bladder was then sutured to the upper posterior wall of the uterus just back of the line of incision, thus bringing the uterus into permanent, mobile anteflexion. The advantages of this procedure, as claimed by Buettner, are that menstruation is assured, the possibility of a chronic

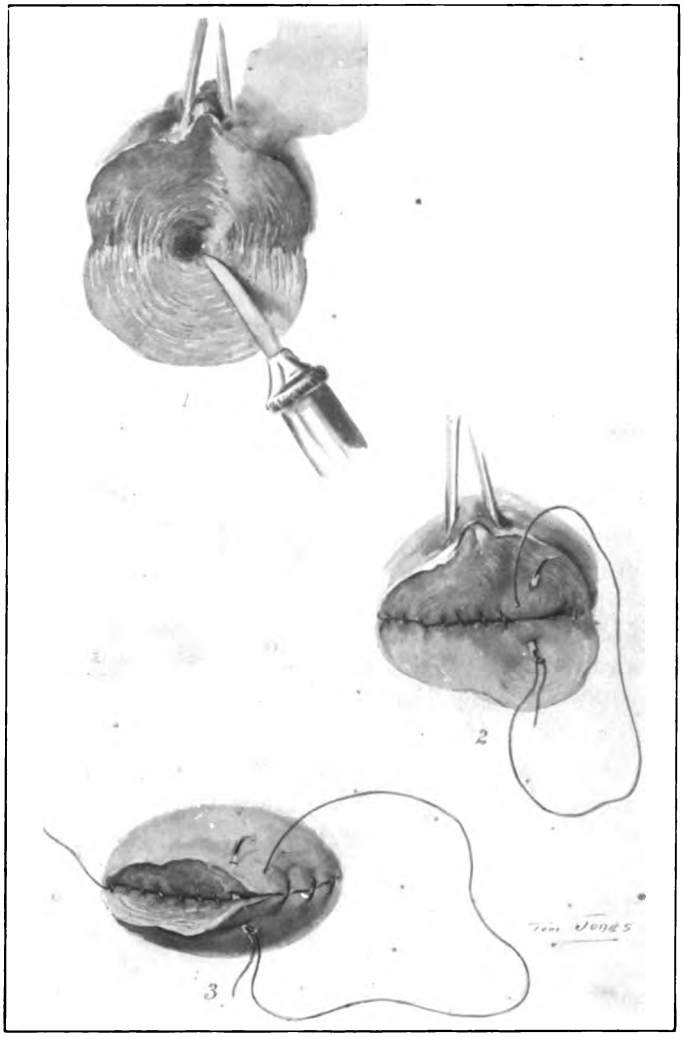


Fig. 2.—*1.* The exposed mucosa is lightly seared with the cautery directly after the fundus of the uterus has been amputated. *2.* The first line of suture closes the uterine cavity by bringing the anterior and posterior uterine walls together, the catgut passing through musculature only. *3.* A continuation of the preceding, carrying the suture back and bringing together the edges of the uterine walls.

metritis is obviated, and menstrual disorders disappear, the flow becoming normal in amount and duration.

Bell's procedure differs in some details. After removal of the tubes and possibly one ovary, Bell excises the fundus of the uterus by ante-

Digitized by Google

rior and posterior incisions from above downward and inward, the ascending branches of the uterine artery are caught, and the anterior and posterior flaps are sutured together by mattress sutures. The cut edges of the mesocervix on one side and the broad ligament on the other are sewn together and the lower ligatured stumps inverted between the layers of peritoneum. The uterine ends of the round ligaments are then sutured with fine silk to the top of the uterine stump and the ligament of the remaining ovary is attached to the round

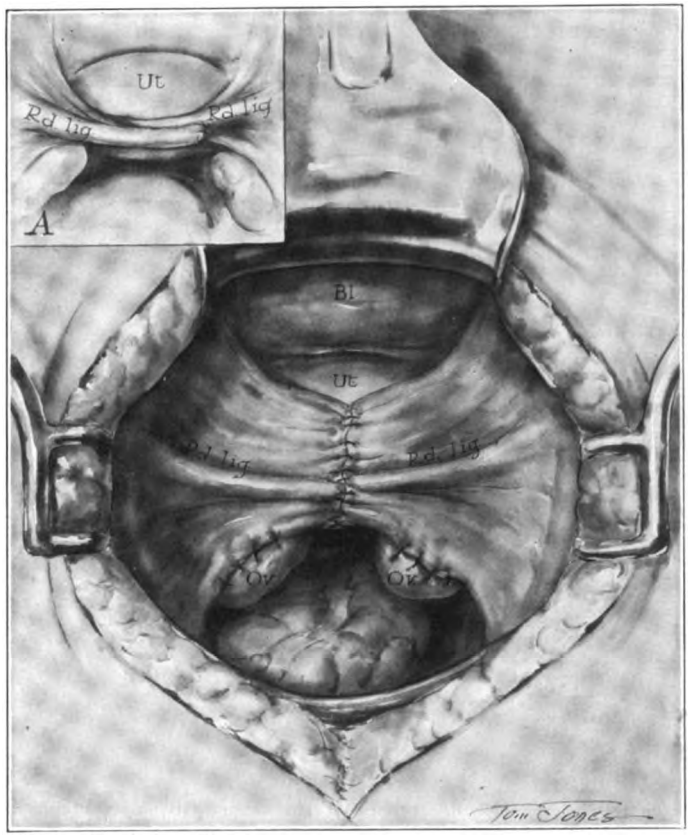


Fig. 3.—After suturing the uterine walls together the round ligaments are imbricated across this new fundus, the right one to the left side and the left one to the right side, as in *A*. The slackened broad ligaments are then brought together from side to side, anteriorly and posteriorly. Each ovary is suspended to its broad ligament. The pouch of Douglas is left open where there are no extensive areas of raw or infiltrated tissue.

ligament on its own side. The operation described by Polak in his recent monograph is a modification of the Bell-Buettner technic, emphasis being placed upon conservation of the ovarian blood supply.

Of the 445 cases in which both tubes were removed the uterus was treated as follows:

In 199 operated cases it was removed. Ventral fixation was performed 41 times, but it should be noted that this procedure was

Digitized by Google

employed only in the earlier cases of the group. In recent years its use has been exceptional. Round ligament shortening was not resorted to in any case, neither was the uterus left unsupported. In 219 cases the uterus was treated by a modification of the operation as described by Bell and Buettner, without following the principle of Fauré.

The tubes are removed by ligature and excision from their infundibulo-pelvic reflection towards the center. The round ligaments are then ligated close to the uterus and cut away and a second ligature is passed through the broad ligament on each side to catch the fundal branches of the uterine artery. These in turn are cut, leaving exposed

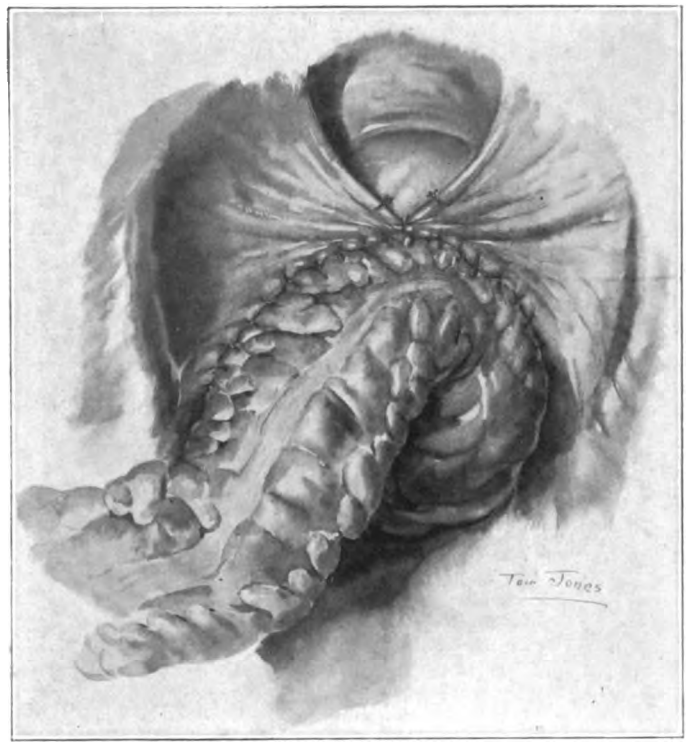


Fig. 4.—Where extensive raw or infiltrated areas are present in the pouch of Douglas, this space is entirely closed over with the sigmoid flexure and rectum.

the entire fundus of the uterus with the two diseased tubes attached. Excision is carried out by transverse incisions anteriorly and posteriorly, from above downward and inward. This removes in the majority of the cases fully one-half of the corpus uteri by bulk but preserves all of the corpus mucosa except that small portion lining the fundus. I estimate that not more than 25 per cent of the corpus mucosa is ever removed by this procedure, and it has never been necessary to ligate the uterine artery. The anterior and posterior flaps are then sutured together with running catgut in two stages, the first

Digitized by Google

closing the uterine cavity and the second bringing into approximation and closing the edges of the wound. With the stump of the uterus now held lightly by a volsellum forceps at its central point, the left round ligament is picked up and sutured into the right horn by an over and over linen thread and the right round ligament into the left uterine horn. This overlapping of the round ligaments is readily effected and quite covers the entire raw edge left in suturing together the two edges of the uterine wall. It also takes up whatever slack may be present in the round ligaments and puts the anterior and posterior layers of the broad ligament on the slack. This renders the next and final step in peritonizing the organ readily possible. With a thread of fine catgut on a round curved needle the broad ligaments on either side are picked up on the level of what would correspond to the anterior culdesac and sutured together from side to side, thus covering the anterior wall of the uterus as far as the round ligaments. The same suture unites the round ligaments at the midpoint of the new fundus and is then carried on down approximating the posterior layers of the broad ligament from either side, the final stitches fastening the broad ligaments securely to the posterior uterine wall as low down as may be desirable. The posterior culdesac is left open if there are no raw peritoneal surfaces, but if extensive raw areas do exist, the culdesac is blocked off by the so-called high sigmoid flexure peritonization. This procedure leaves a small uterus in normal position entirely covered anteriorly and across its fundus by clean peritoneal folds and at the same time it reinforces the transverse septum that is normally present in the pelvis. Peritonization is completed by suspending each ovary to the broad ligament on its respective side in such a way as to roll under the raw edge left by the removal of the tube as far as the infundibulopelvic ligament. In all respects this treatment of the uterus is similar to Bell's "acro-hystero-salpingectomy" except in the method of peritonization which requires freeing the round ligaments. In my opinion imbrication of the round and approximation of the broad ligaments from side to side over the uterus is superior to the method described by Buettner. I do not believe that the fundus is removed amply enough to satisfy the advantages set forth by Bell or Polak without first freeing the round ligaments.

If the uterus has been in retroversion and the cervix continues to swing too far forward, shortening of the uterosacral ligaments is carried out exactly as is done in association with round ligament shortening for simple uterine retroversion.

The advantages of such disposition of the uterus after bilateral salpingectomy are that the uterus continues to menstruate and its fundus which, as Bell has pointed out, is the most infected portion of the corpus uteri, is removed.

Digitized by Google

In only exceptional cases have the round ligaments been so infiltrated on one or both sides as to render imbrication impossible. In such cases I have fastened each ligament into the uterine angle on its own side and then covered the fundus of the uterus with vesical peritoneum as described by Buettner, or where the posterior culdesac has been raw, I have brought the appendices epiploicae of the sigmoid flexure up over it.

The treatment of the cervix depends, of course, upon its condition. In many of these cases the cervix shows the redness and swelling of a cervicitis. In that proportion of cases in which the cervix is appreciably involved in chronic inflammatory processes or where it has been lacerated by childbirth, it is amputated preferably by mid or high amputation, otherwise it is let alone.

While fixation of the uterus into the abdominal wall was used in the early years of my experience, this procedure has been virtually abandoned in favor of the operation of defundation as here described. In other words, today I either take out the uterus or amputate its fundus, the latter method being reserved for the young and particularly for the childless. Patients operated upon as long ago as 1913 are still menstruating. There has been little or no dysmenorrhea complained of and in not one instance has the follow-up revealed a premature menopause or a continuance of excessive uterine bleeding. On the contrary the menses are scanty in amount and their duration from one to three days. The problem of leucorrhea remains, but it always will remain as long as the cervix remains. After reposition of a displaced uterus the congested cervix readily clears up, as was pointed out by Sir J. Y. Simpson years ago. This is particularly true after removal of suppurating tubes. The discharge is much less in amount, is less constant and in numerous cases is no longer noticed by the patient.

While it is not the purpose of this paper to take up in detail the problem of the disposition of the ovary, it will be of interest to note that of the cases in this tabulation both ovaries were removed 85 times. In these cases, of course, the uterus was always removed. One ovary was left 281 times. Of the 85 bilateral oophorectomies, autotransplantation was performed but 9 times. In 5 cases no ovarian tissue was to be found on one side. Bilateral ovarian resection was carried out in 46 cases and unilateral resection in 146 cases. The microcystic ovary I no longer resect. In none of the cases seen subsequently has it been necessary to operate for removal of the ovary or of the defundated uterus, whereas five hysterectomies have later been performed out of the 41 cases treated by ventrofixation. Preservation of ovarian tissue prior to the menopause years is invaluable to the patient, and I am fully convinced that better results are obtained where the ovary

Digitized by Google

is left in its normal situation with its normal blood supply than where it is removed and transplanted elsewhere.

The conclusions offered as a result of this study are:

First. Ventral fixation of the uterus has objections which render it an undesirable procedure in association with removal of both tubes.

Second. That round ligament shortening is unsuitable where the tubes have been removed and should be reserved for the simpler uterine displacements where pregnancy is to follow.

Third. That the reduction of the uterus in size by removal of its entire fundus is a ready method of disposing of the organ after salpingectomy where, particularly in young women, it is desirable to preserve menstruation. Defundation becomes a logical procedure not only in operating for the cure of infectious processes, but also for simple sterilization, for ectopic pregnancy, ovarian cystomata and like conditions. Its only contraindication from a technical point of view is that of procidentia uteri.

REFERENCES

Bell, W. Blair: Oxford Surgery, 1913, p. 249. *Buettner, O.*: Trans. Internat. Cong. Med., London, 1913. *Buettner, O.*: Technik der Peritonealen Wundbehandlung des Weiblichen Beckens, Zürich, 1918, p. 238. *Polak, John O.*: Pelvic Inflammation in Women, 1921, pp. 164-171.

DISCUSSION ON THE PAPERS OF DRS. WATKINS, HOLDEN, AND CULBERTSON

DR. WILLIAM P. GRAVES, BOSTON, MASSACHUSETTS.—Dr. Watkins' excellent paper brings up the consideration of the matured ovary in its rôle as an apparatus for reproduction and in contrast to the other glands of internal secretion, even including the testicle, its comparative lack of importance to the general organisms of the women.

I should like also to discuss the very important question of the relationship between ovulation and menstruation, and to show the necessity for harmony between these two functions. I should like to show, for example, the danger to a patient's nervous organization that may attend such disharmony as sometimes follows operations that allow for ovulation but prevent menstruation or when deficient activity in one or both functions is produced by mutilation of the pelvic organs. It would be interesting also to discuss the ovary as an organ of internal secretion from the standpoint of the specific tissue in which the secretion is probably elaborated, and the bearing which this has on the subject of ovarian therapy.

I shall confine myself, however, to one statement made by Dr. Watkins which, if I read it correctly, is to the effect that the writer has never noted the serious changes, such as adhesions and cystic degeneration that are claimed to occur in ovaries that have been left *in situ* after hysterectomy. In answer to this statement I have brought with me a few specimens, the histories of which I will recount.

The patient from whom one of these was taken is now in the hospital having been operated on about 10 days ago. I had intended to keep this case over until next week and invite Dr. Watkins to be present at the operation, but the symptoms were so severe that I could not wait. The patient was first operated on last September by a surgeon in a neighboring city. The operation was for a pelvic inflammation of gonorrheal origin. A hysterectomy was performed, the right ovary being left *in situ*. After the operation the patient had very severe hot flushes

Digitized by Google

and troublesome molimena at the times of her regular periods. In the course of time the nervous manifestations at the time of the periods took the form of spasmodic muscular twitchings, and violent hiccoughs. Of late the spells of hiccoughs had not been confined to the times of the menstrual periods, and were becoming more and more frequent. Examination of the patient about a month ago revealed a young woman of 25, very pale, and hysterical. In the pelvis was a cystic ovary on the right about the size of a mandarin orange. The operation consisted of the removal of an extremely adherent cyst with involvement of the neighboring coils of intestine. The contents of the cyst were of the chocolate variety. Since the operation the patient has had no hiccoughs though previously she had had five or six spells daily. She has been entirely placid during the convalescence. Hot flushes have continued about as before.

In the second case, this cyst was taken from a woman, 27 years of age, who, two years previously had been operated on in New York for pelvic inflammation, hysterectomy having been done with the retention of one ovary. Soon after the operation she began to have dragging sensations in the right side, with occasional very acute attacks of pain. This went on for two years. She came to the Free Hospital for Women and was operated upon by my associate Dr. Pemberton. The cyst was removed, and the patient made a complete recovery.

It is quite interesting to see that there is a small corpus luteum on the surface of the cyst, bearing out Dr. Watkins' claim.

The next specimen consists of necrotic cancerous material. The patient was operated on at the Beverly Hospital. After the operation, on section of the uterus, it was found that there was a carcinoma of the fundus in connection with the fibroids. About a year after the operation, when I saw the patient she was bleeding from the cervical stump. At that time I supposed she was having a recurrence of the carcinoma in the cervical stump. On opening the abdomen I found the right ovary, which had been left *in situ*, a mass of cancerous tissue. This was scooped out by the hand. It was the material which I show you. This case illustrated one of the dangers in operating on fibroids. A considerable percentage of them are associated with adenocarcinoma of the endometrium. We all know that the first metastasis from carcinoma of the fundus is in the ovaries, and that it may occur early. If in operating on a large fibroid, one leaves in the ovary, it is important to cut the specimen open before closing the wound to make sure that there is no adenocarcinoma in the body of the uterus.

There is one other case I wish to report. A patient was operated at the Massachusetts General Hospital for fibroids of the uterus. Six years later she came to the Free Hospital for Women with a large mass in the abdomen. Operation disclosed a large malignant papillary cystadenoma of the ovary on one side, and on the other a very small ovary in which there was a beginning process of the cystic adenomatous type.

The two second cases illustrate the necessity of care when one operates on fibroid tumors of the uterus, and leaves ovaries *in situ*. The first two cases illustrate the necessity of removing the ovary in cases of hysterectomy for pelvic inflammation. Such ovaries are practically sure to become adherent and cystic as in these two cases, and cause such symptoms as to necessitate an operation that is very much more difficult and dangerous than the original hysterectomy.

DR. EDWARD H. RICHARDSON, BALTIMORE, MARYLAND.—I have been able to settle the indications for conservation of the ovary in my own mind by conceiving the ovaries as having a two-fold function. It seems very clear that if one differentiates the function of the ovary as regards menstruation and reproduction on the one hand, and then the function of the ovary in its relation to the whole endocrine system on the other, he can get a thorough conception of the advisability

Digitized by Google

of retaining ovaries when it is possible. We are all familiar with the strong chain of evidence which can be collected to show that entirely outside of that period of the woman's life associated with reproduction, that is, before puberty—and I am not at all convinced that it does not hold true also after the menopause—the ovary has a most important function in the body metabolism. Certainly it has before puberty. So far as I know, there is no evidence at present to prove conclusively that the ovary ceases to function after menstruation has ceased and after the child-bearing period. On the contrary, there is evidence to show there is functional activity in the ovary after the menopause. My own feeling about it is, unless one has a clear indication for removal of the ovary at the time of operation, regardless of the age of the woman, the ovary should be conserved.

The question of what happens to a conserved ovary is a complex one, and I am quite in accord with Dr. Graves in his opinion when, in inflammatory cases, where the ovary is adherent or where it is involved in inflammatory disease, and one can reasonably assume such an ovary will become adherent and undergo cystic degeneration, it had better be removed. But I certainly believe, so far as my observation goes, when one takes hospital statistics and hospital histories and undertakes to determine what percentage of conserved ovaries subsequently undergo cystic degeneration changes and require removal, he will find it difficult in most instances in reading a description of the operation and the condition of the ovary at the time of operation, to determine from the record what was done or what was the condition of the ovary. It is to be remembered that in a very important percentage, the circulation of the ovary is interfered with in the removal of the uterus. If you remove the tube, provided you are not careful to safeguard the anastomosis in the mesosalpinx between the arcuate vessels with the terminal uterine artery, in the removal of the uterus, you cut off the supply of blood which goes to the uterine artery. If you do not stick close to the tube and conserve the collateral circulation by the removal of the tube with the uterus, you cut off the circulation of one-third of the ovary in probably over one-half of the cases. It is not surprising therefore that subsequently such ovaries degenerate, and unless we have a record of not only the condition of the ovary as regards disease at the time of operation, but also have a specific note as to whether the operator improved the collateral circulation and safeguarded it in the removal of the ovaries, we will have a large percentage of degenerative changes in such ovaries. In my own personal experience I have never seen yet a case of subsequent cystic degeneration of the ovary requiring removal, where the ovary was sound at the time of operation and where the tube was conserved. I feel strongly therefore that the important practical surgical point is to safeguard the circulation by retaining the tubes wherever possible, and I also feel the ovary should be conserved because at present we do not know that the ovary ceases to function in other important respects than that of menstruation and reproduction even after the menopause.

DR. W. BLAIR BELL, LIVERPOOL, ENGLAND (by invitation).—In the treatment of lesions associated with chronic infections in the pelvis, we have the opportunity of showing our faith in, and adherence to, the essential principles of surgery, namely, the removal or repair of diseased structures that are causing symptoms, and the conservation of function. These I hold to be the essential principles of surgery.

In regard, therefore, to the various operative procedures employed, I think we must always have these principles in mind. When we do, we find we cannot adopt one operation for every type of pelvic infection. We must adapt our procedures to the lesions present, and take into consideration the causal factors of these lesions.

My own surgical procedures are based on what I believe to be the causal factors of the disease and the lesions that have been produced thereby. If there has been, for instance, an appendicular infection which has sealed the abdominal ostium

Digitized by Google

of a tube, there is no reason in a majority of cases to remove that tube. A salpingostomy is all that is necessary. The lining membrane is uninfected.

When we are dealing with tuberculosis we must take into consideration the way in which the infection has reached the pelvic organs. If there is a general infection of the peritoneum, one always finds, sooner or later, that if the tubes are not removed at the time the fluid is drained away, tuberculous pyosalpinges will be formed. Mayo indeed, has rightly insisted on removal of the tubes at the time the fluid is drained from the peritoneal cavity. In the more latent conditions without acute peritoneal infection it is necessary to remove the whole uterus, for I have seen descending infection start in the peritoneum, go through the tubes and not only involve the cervix, but also the vault of the vagina.

With regard to the more common gonorrheal infections, it is common knowledge that in a large proportion of cases the patient complains of menorrhagia. Associated with these may be a profuse leucorrheal discharge. If the infection be active in the cervix, it is important first to amputate the cervix. Afterwards, in treating a serious intrapelvic infection, I perform the operation which I described in 1913, and which has been mentioned by Dr. Culbertson. In that operation I aim to remove the diseased tubes, which are converted into pyosalpinges, and to remove the fundus of the uterus, because I have shown that on pathologic examination it is frequently found to be deeply infected. In removing the fundus of the uterus I remove the cause of the menorrhagia.

I need not go into the details of the operation which I have published and which many of you practice. I have performed it 125 times. I use it, as I have said, almost entirely for gonorrheal infections.

If I may say so, without having tried it, on general principles I cannot approve of Dr. Holden's operation. He is leaving behind diseased structures. If the case happens to be one of streptococcic infection, there may be trouble subsequently, for as Dr. A. H. Curtis has pointed out, these organisms may remain latent in the tubes for many years. It does not seem to me to be a rational operation, and I would prefer to remove completely badly diseased structures. There is no objection to removing a tube except for the fact, which has already been mentioned, that in removing the tubes which are usually adherent pyosalpinges, it is almost impossible to excise them in such a way as to preserve the blood supply of the ovary. I have given up leaving any ovarian tissue at all, in nearly all these cases. I remove both tubes, the ovaries and fundus of the uterus in one piece. I am not content, however, with that as a functional result. I therefore take a piece of ovary and graft it. I have grafted ovarian tissue in over 100 cases. We have recently investigated these cases, and we find that we have obtained functional results in over 80 per cent of them. In many, both ovaries had been converted into abscess cavities, containing pus. Under such circumstances I have implanted pieces of the ovaries in the internal oblique muscle alongside a drainage tube, passed through a stabwound at some distance from the median line, yet never has one of these grafts come away, and many of the women are still menstruating.

The ovarian function is a very important one not only in its bearing on reproduction, but also because its secretion is a link between many of the ductless glands.

In my ovarian extirpation experiments, I found considerable changes in the pituitary and thyroid, and I do not believe it is possible to break a chain of such metabolic importance and leave the patient perfectly normal afterwards. By grafting ovarian tissue, we attempt to conserve the essential metabolic functions of the ovary.

DR. CURTIS.—In case an ovary or part of it is grafted, how long is the menstrual function preserved?

Digitized by Google

DR. BELL.—I now have cases that have continued to menstruate for five years. They have not yet stopped, hence I am not able to answer Dr. Curtis' question.

I hope and trust that it will not go out to England that there is a consensus of opinion among the members of the American Gynecological Society that the ovarian function is of no importance. We had a discussion on ovarian grafting in England not long ago when several gynecologists stated that this was unnecessary work, that the ovary was of no use to any woman. At the close of the discussion, a practitioner rose and said that he had been very much interested in the discussion, inasmuch as he happened to have patients who had been operated on by those who had stated that ovarian function is of no importance, and that these patients were now the bane of his life. (Laughter.)

I do want to emphasize the fact that the ovary is an organ of importance, but that it is unnecessary and unwise in many instances to leave an adherent and infected ovary in the pelvis for it is liable to become cystic and that it is better in such circumstances to remove it and to resort to ovarian grafting. The grafting must be done properly with careful technic.

DR. CHARLES C. NORRIS, PHILADELPHIA.—I believe that the practice of gynecology has been well standardized. The question of ovarian conservation, however, is one on which a considerable difference of opinion exists. Our aim and object, of course, is to cure patients, and I believe the only way to determine this question is to study the end-results in series of cases.

Dr. Clark and I prepared a paper that we were unable to place on the program today. This comprised a study of 232 cases of myomata of the uterus, in some of which the ovaries had been conserved, and others bilateral oophorectomy had been performed. In none of these cases had less than one year elapsed since operation. In other words, we endeavored to determine which set of patients were the most comfortable—those in whom ovarian conservation had been practiced, or those in whom the ovaries had been ablated. In one-third of myoma cases the adnexa are inflamed. A questionnaire was sent to these patients, and I may say, in passing, that this form of inquiry is not a very satisfactory method of determining this subject. There is no single symptom from which women suffer as the result of castration that cannot be simulated by other conditions, and it is only by studying each case individually, noting how soon after operation the symptoms come on, how severe they are, and particularly the type of patient in whom they are present, that one can determine definitely whether or not the symptoms are due to the castration or to some other condition. J. O. Polak, in one of his papers, has insisted that a healthy woman, one free from pain, is far less likely to be neurotic and subject to the usual phenomena of the artificial menopause than is one who is suffering from some malady. That is undoubtedly a fact. If we can cure a patient of her pelvic symptoms, even if we must perform a double oophorectomy, this is wiser than to conserve an ovary that will subsequently cause trouble. That the ovary without the uterus is a functionating organ I feel sure is true. That the ovary is an unimportant organ I do not believe. The question, in large measure, sifts itself down to whether or not we can conserve the ovary, so that it will not give rise to subsequent trouble. Conserved ovaries may undergo cystic degeneration and cause dyspareunia and various other symptoms.

I believe that in this more than in most operative procedures, surgical judgment is essential. We teach our students at the University of Pennsylvania that in ovarian conservation three essentials are requisite: In the first place, the ovary itself must be in fairly good condition. In other words, it must not be the seat of a disease that will develop after removal of the uterus. Graves has reported cases in which the ovary was the seat of carcinoma, perhaps metastatic in origin. We make it a rule that on removing the uterus it should be opened before the

Digitized by Google

operation is over in order to determine whether or not carcinoma is present. If such is found bilateral salpingo-oophorectomy should be performed. If the ovary is severely diseased, that is, the seat of extensive cystic degeneration, etc., it is unwise to conserve it. It is far better to excise such an ovary than to attempt conservation. Secondly, successful conservation cannot be practiced if the blood supply is interfered with. Such interference will cause the ovary to become edematous and cystic. The third point to be remembered is that the ovary must be left in good position. Therefore, the matter again sifts itself down to the individual equation of the operator and his ability to judge of the condition of the ovary *in situ*. Furthermore, it is largely a question of further study of a series of ovaries in laboratories, in order to determine their condition, and then to correlate the findings with those found at operation, and more especially with the end-results. We know, as a fact, that we can remove ovaries and cure patients. The first question in our questionnaire was, "Have you pain as a result of your operation? Have you been improved or cured, or are you worse since the operation?" In our whole series of cases, and it may have been a particularly fortunate series, 99.5 per cent answered that they had been improved or cured regardless of whether or not the ovaries had been removed. About 20 per cent of our cases were examined by us subsequently, and in these cases the advantage of ovarian conservation was particularly striking. In our entire series, it has not been necessary subsequently to remove an ovary, a fact brought out also by Dr. Culbertson in his paper, read this morning, in which, in some 500 cases, no subsequent operation was necessary. If we operate along lines that will conserve the ovarian blood supply, if we leave the ovary in good position, if we exercise good surgical judgment, it is possible with myomata of the uterus to save a large percentage of ovaries. Our study shows very definitely that these cases were more comfortable subsequently and they did not suffer so severely from the effects of the artificial menopause as did those in whom both ovaries were removed.

Of 261 conserved ovaries, none of which have been operated on less than one year ago, and from that period up to thirteen years, not a single one of the ovaries conserved by us has required subsequent removal. This is a strong argument for ovarian conservation in properly selected cases.

The question of the atrophy which results from bilateral oophorectomy is important, since in many cases this will give rise to considerable trouble following operation. In our clinic we have adopted as a routine the rule that no plastic operations are to be performed for minor degrees of relaxation upon patients in whom a double oophorectomy is required. This is a rule that has been forced upon us as the result of experience.

The question of preserving the menstrual function is also an important one. I believe that there are many women in whom menstruation has a definite bearing upon their subsequent comfort.

DR. JOHN O. POLAK, BROOKLYN, NEW YORK.—The question of conservation of the ovary and that ovarian function is a definite necessity, is one I think we are all agreed upon with the exception of Dr. Graves. The other point is that we have to individualize in each case. For instance, our studies in removal of ovaries in relation to fibroids, and our studies of ablation in pus cases, are very different, and so are our follow-up results. In the first place, we find that a very large proportion of women with fibroids have hypertension, and that the removal of the ovary in these patients increases the hypertension, and while the internist tells us that this hypertension, is an essential hypertension, the patients are not able to bear it, and they are uncomfortable, so that we make a strong effort to conserve an ovary when we remove fibroid tumors of long standing and when we conserve the ovary I do what Dr. Richardson called attention to, to conserve the tube by a technic which I have already published.

Digitized by Google

In our first series of 300 cases followed up, there were 41 in which we had subsequently to remove the ovary because of symptoms or pathology produced. We then published 132 cases where we had done the radical procedure, and we almost felt that Dr. Graves was right, until these patients came back to us with more marked nervous symptoms and were physical wrecks.

In our last series, we are making every effort to conserve ovaries, and we have so far not had to remove a single ovary which had been retained. I believe that this is due to two facts, namely we are more careful in trying to individualize the particular case, and are more carefully studying the condition of the ovary after we have separated it from its bad associations in pus cases. We are conserving the tube wherever possible, and furthermore, we are doing, since 1912, what Dr. Bell has called attention to, i. e. a partial resection of the fundus of the uterus. If the ovarian circulation can be maintained, and the ovary is primarily anywhere near its healthy state, and is not allowed to drop into the culdesac and get into bad company again, the functional part of that ovary remains for the benefit of the economy.

DR. JOSEPH BRETTAUER, NEW YORK CITY.—I think Dr. Polak as usual has hit the nail on the head and in his concise way has expressed the opinion of nearly all of us. But the gist of this whole discussion and the contents of these papers make me believe more than ever that in inflammatory disease of the adnexa conservatism is more important than the decision to leave or to remove the ovary. When it is necessary to operate for inflammatory diseases, my experience has been that a patient is better off with both tubes and both ovaries out than in.

As to the results, I must say I have not had the material with which Dr. Holden and Dr. Culbertson have had to deal. These cases are rather infrequent with me. The results in my 30 years experience in dealing with these cases are bad where I have tried to conserve a part or the entire diseased ovary. You cannot tell that an ovary is diseased in an inflammatory case by looking at it, and the results when the ovaries were removed were satisfactory. I want to impress upon you that it was the principle of ultraconservatism which guided me in the selection of cases and in the indications for any operative intervention. In the ante-x-ray days I selected 50 cases of fibroids, every one of the patients above 40 years of age, and alternately I removed the uterus and both ovaries in one series, and in the next, if conditions were favorable, I removed the uterus alone and left the adnexa. Five years after that I had to follow up these cases. In the 37 cases the postoperative condition was slight, was minimal, giving me the impression that it would not make any difference if I left the appendages or not. Again, these patients were all above 40. Since the x-ray days I have learned to restrict the indications for x-ray treatment of fibroids to women above 40. The artificial menopause is more stormy when they are young, and the ovaries are removed.

DR. ARTHUR H. CURTIS, CHICAGO, ILLINOIS.—In all this discussion concerning pus tubes I hope we do mean a chronic or prolonged infection of the tubes, because we all know pus tubes should not be operated on in the acute stage.

In what Dr. Graves has said concerning removal of the ovaries, he has hit on one point of considerable interest and importance, if one diseased ovary or only part of one diseased ovary remains, there is danger of only partial function.

Within the last eight months I have seen four patients who had previously been operated on elsewhere in whom there has been persistent discomfort, great nervousness, and persistent flushings from the remaining ovary having been left in, and yet not doing sufficient work, so that the patient was relieved from the menopause flushes. If a patient has remaining only one diseased ovary or part of an ovary, there is danger of menopausal symptoms which may persist for as much as a dozen years.

Again, in making a decision concerning how radical we shall be in extirpating

Digitized by Google

the ovaries we must consider the bacteriologic cause of the trouble. If there is a streptococcic or tuberculous infection, we very likely will have bacteria still remaining viable in the tissues, with the result that frequently we will encounter postoperative infection of the ovary with cystic or other serious change. Therefore more radical measures appear indicated in streptococcus or tuberculous infection of the ovaries than in gonorrheal disease of equal severity.

DR. THOMAS J. WATKINS, CHICAGO, (closing).—The sex glands have much resistance to infection. The testicle has to be seldom removed for infection although it is often infected. The same is true of the ovary. Abscess of the ovary from contamination from the tube is uncommon; I mean a central abscess of the ovary. These generally result from puerperal infections. The nonpuerperal ovarian abscesses are usually infections of recent corpora lutea. The danger therefore of infections of the ovary left after salpingectomy is the presence of a fresh corpus luteum. We have had to remove ovaries after doing salpingectomy, much less common now than formerly.

I concur in all Dr. Culbertson has said relative to high amputation. There have been too many repeated abdominal sections which are distressing to the patient, disturbing to the surgeon, and discrediting to surgery.

I was interested in Dr. Bell's discussion, as we have been in his other discussions, and I was especially interested in the length of time his patients have continued to menstruate after ovarian grafts. I would suggest that possibly the reason some of them have continued to menstruate for so long a time is because they may have had ovarian tissue left incorporated in adhesions. I have had a number of patients menstruate after I supposed I had removed both ovaries. I had left ovarian structure in adhesions. Authentic cases are on record of patients having borne children after both ovaries and tubes were supposed to have been removed.

DR. FREDERICK C. HOLDEN, NEW YORK CITY, (closing).—The principal reason which stimulated a short experimental study with this type of cases was that I have had to reoperate on so many where there was pain following conservation of ovarian tissue.

At Bellevue Hospital scarcely a week passes without our having to reoperate on patients in whom ovaries have been conserved at previous operations. It was with the idea of having better ovarian circulation and consequently fewer painful ovaries, that I tried this operation in gonorrheal cases.

It may be that I have been fortunate in not having any fatality. The morbidity has been no greater than when more radical operations are done for similar pathology.

These operations were all performed on women under thirty years of age, with the idea of maintaining menstruation and sexual life, and my hope was that I might be able to symptomatically cure 50 per cent of the cases and greatly relieve 25 per cent with the chance of having to reoperate on the remaining 25 per cent. To my mind the possibility of reoperating on a small proportion of these young women is better practice than any radical operation which totally unsexes them.

We have talked this morning about the value of menstruation, but there has been no mention made of sexual life, and we as gynecologists, I am sure, should not let this function pass unnoticed.

In reference to what Dr. Watkins has said in regard to any women having a number of operations, I might say that we had at Bellevue Hospital recently a girl of 19 who had had her third abdominal operation before coming to Bellevue.

DR. CAREY CULBERTSON, CHICAGO, (closing).—I agree with Dr. Watkins that the ovary should be conserved whenever possible, and I agree with Dr. Graves that the ovary is the weak link in the endocrine chain, and that its function largely depends upon the way it is stimulated or inhibited by the stronger elements of this system.

Digitized by Google

Regarding the conservation of the ovary, a point which Dr. Norris brought out, I want to call attention to the fact that the series I have reported consists entirely of cases of pelvic peritonitis. I have not brought into the series cases of fibroids except those wherein fibroids appeared incidental to the inflammatory condition which brought about the attempt to cure. But I take the same attitude toward the ovary in fibroids that I have in this series. I should like to ask Dr. Bell whether he follows the same attitude, that is, of removal and transplantation in treating fibroids as he does in treating pelvic infections.

I wish to ask Dr. Bell one other question. Reference was made to patients menstruating five years after ovarian transplantation was made, and I would like to ask him in how many cases in which he has transplanted ovaries have the women ceased to menstruate.

The examination of the ovary, which Dr. Curtis emphasized in his remarks, is very important. The ovary should be inspected minutely particularly to find small tumors. I have found dermoid cysts not more than half a centimeter in diameter, and I have found pseudomucinous cysts as small as a centimeter in diameter, but if an ovary gives the appearance of simply cystic degeneration, I prefer to leave it undisturbed. The pain which some of these patients have on one side or the other not only before but after operation, I do not attribute always to the ovary. I think that is a great mistake which gynecologists should not make, to attribute right and left-sided pain to the ovary in every case. I believe the majority of these pains are intestinal. Many of these patients have what the internist recognizes as a colitis.

Recently I have been removing the ovary along with the uterus when the patient was in the climacteric, not conserving it as Dr. Watkins has suggested, for the reason that I believe the climacteric is shortened where it is precipitated. It may be more stormy, but I believe it is shortened just as I believe the climacteric is shortened when the patient is treated for it. Placing the patient under treatment either relieves her of the vasomotor and psychic symptoms or modifies them, but in either case the entire course of endocrine reorganization seems to be shortened.

Regarding Dr. Curtis' remarks, none of the 518 cases were operated on in the acute stage. I accepted the verdict of this society many years ago that operation in cases of acute pyosalpinx or acute pelvic peritonitis is bad surgery.

I think Dr. Watkins is right in emphasizing the danger of repeated operations. I am inclined to be conservative in young women the first time I operate on them, but patients who have come back after one or two operations, should no longer be treated conservatively.

I have not had the experience of Dr. Holden in treating these chronic inflammatory processes by the conservative procedure which he has described, therefore I cannot say more than this: We all know, of course, that where these cases are drained they will often become symptomless for a period of time. A small proportion of my cases were treated prior to laparotomy by vaginal drainage.

I think it is better to evacuate large amounts of pus in the pelvis before opening the abdomen even if the pus is sterile. We know that some of the cases drained vaginally become symptomatically well, so well that they may refuse further operation. Whether it was an actual return to health or simply a comparative relief from the symptoms, I do not know. I think we have all had that experience, and I can see how the operation which Dr. Holden has recommended would be attended by the relief of symptoms at least temporarily, if not for a long time. But I have not followed the procedure he has so ably outlined.

In reply to Dr. Curtis' question relative to patients showing vasomotor or climacteric disturbances after operation, I could only say that the conserved ovary has ceased to function for one reason or another. I do not know why. So far as my follow-up was effective, no such results were observed in the series reported.

Digitized by Google

CONCERNING TORSION OF THE UTERINE ADNEXA OCCURRING BEFORE PUBERTY, TOGETHER WITH A CONSIDERATION OF TORSION OF NORMAL ADNEXA. REPORT OF A CASE AND A REVIEW OF THE LITERATURE SINCE 1900

By Richard R. Smith, M.D., and William J. Butler, M.D.
Grand Rapids, Michigan

CONCEDING for the moment that the torsion of normal uterine adnexa is an accepted fact, a classification of the different types of adnexal torsion may be made as follows:

I. Pathological Adnexa.
- (1). Torsion of ovarian tumors.
  - (A). Before puberty.
  - (B). After puberty.
    - (a). In the nonpregnant state.
    - (b). During pregnancy and the puerperium.
- (2). Torsion of tubal tumors including hydrosalpinx, hematosalpinx and pyosalpinx.

II. Normal Adnexa.
- (1). Within the abdomen.
  - (A). In the nonpregnant state.
  - (B). During pregnancy.
- (2). Within a hernial sac.
  (Not to be confused with simple strangulation.)

That ovarian tumors in the adult, especially cysts, are very prone to undergo torsion of the pedicle, is well known to gynecologists and to medical men in general. Such a complication giving rise, as it frequently does, to violent and serious symptoms, has provoked considerable interest and given rise to an extensive literature upon the subject. The accident is by no means an infrequent one. A. Martin[9] reports that 5 per cent of the ovarian tumors upon which he has operated were the subject of torsion, and B. Küstner[9] reports 47 per cent. Such figures, inexact as they are in showing how frequent the complication is, at least demonstrate that the subject is important and justify a critical study of every phase of it.

Viewing the whole topic of torsion of the uterine adnexa in a comprehensive way we may classify it conveniently as we have done at the beginning of this article. It will be noted that the most important items are already well known or have at least been well covered in

Digitized by Google

other papers. Anspach's[1] article discussing a less common phase is full of interesting facts and is the best we have found on the twisting of tubal enlargements. He has reviewed and summarized 88 reported cases and has distinctly advanced our knowledge of this condition.

There are some phases of the subject as a whole in which professional experience has been relatively small. Among them we may properly place torsion of the uterine adnexa in childhood, and that of normal appendages. In the literature of the past 20 years we have been able to collect but 25 instances of torsion of ovarian tumors before puberty. Our interest in the subject was aroused by the observation of the following case, which before the examination by the pathologist seemed to be one of torsion of a normal uterine appendage and which we believe yet might properly be discussed as such. The small cyst that was found had not materially changed the size of the ovary so that this has led us to a consideration of the twisting of normal adnexa.

M. M., age nine, entered Blodgett Memorial Hospital on May 28, 1920, with the diagnosis of acute appendicitis. Four days previous to admission the child had been seized with severe pain in the right lower quadrant. She vomited the evening of the day of the onset and this was repeated once or twice on each of the two following days, ceasing on the fourth day. She had been given no food since the beginning, except a little broth after the vomiting ceased. The pain continued in moderate severity and was intermittent. She had some pain when she evacuated the bladder. Had never had any previous similar attacks. The physical examination showed a well-nourished child, normally developed for her age. The child appeared moderately ill. Temperature on entrance 101.° Pulse 126. Respiration 26. The abdomen was very slightly, if any, distended, and there was a suggestion only of rigidity confined to the right lower quadrant. There was well defined tenderness in this area. Her abdominal cutaneous reflexes were all present. A slight dullness was noted in the right lower quadrant, but no mass could be made out. Rectal examination showed a tender, indefinite mass or fullness in the right side of the culdesac rather high up. Urinalysis showed albumin and a few leucocytes in the urine. Blood count showed 14,000 leucocytes and the differential count, polymorphonuclears 84, large lymphocytes 6, and small lymphocytes 10. Although the lack of rigidity was somewhat unusual, we could only conclude that she was suffering from an acute appendicitis. She was operated upon at once.

Operation.—The usual gridiron incision in the right lower quadrant. On opening the abdomen a small amount of bloody exudate escaped, coming apparently from the pelvis. A firm mass was found on the right side which proved to be the tube and ovary twisted in such a way as to completely block the circulation of both. It was black in color. The mass was about the size of the average normal adult ovary. It was brought to the surface, the pedicle untwisted and ligated, and the mass removed. The uterus was small and undeveloped. The opposite adnexa were palpated, and a small, apparently normal ovary identified. During the removal of the right appendage the appendix came into view. It was slightly edematous, but no more so than the surrounding parts. It was removed and the abdomen closed without drainage. The patient made an uneventful recovery, leaving the hospital 14 days later.

Pathological examination by Dr. Geo. L. Bond, shows that the tissue consisted of a dark mass densely infiltrated with blood which had undoubtedly increased its size

Digitized by Google

to a considerable extent. The mass measured 4 cm. x 6 cm. There was a small cyst present in the mass 3.7 cm. x 2.1 cm. The whole mass was about the size of the average adult ovary. Between the cyst and the tube there was a distinct membrane, probably the outer wall of the cyst. Microscopically the tube wall was infiltrated with round cells and leucocytes. The tube was edematous and the vessels filled with blood. The ovarian structure was lost, being replaced by partly organized clots. The cyst wall was formed of old, dense, edematous, fibrous tissue, and epithelial cells could be distinguished in its surroundings. The exact nature of the cyst could not be determined, but it resembled an ordinary follicular one of the ovary. The appendix showed periappendiceal changes, with great thickening of the peritoneal coat. There was no reason to believe that an acute appendicitis existed, the changes in the appendix undoubtedly being secondary.

We have collected, as above stated, twenty-five other cases of torsion of ovarian tumors before puberty, which we have abstracted and reviewed.

CASE 1.—Harrigan: Am. Jour. Obst., 1915, lxxi, 808. Age twelve. Seen four days after the onset. Complaints were abdominal pain and persistent vomiting. Rigidity present over the lower abdomen. Rectal mass palpable. As to diagnosis, appendicitis, tuberculous peritonitis and ovarian cyst were considered. At operation an orange sized cyst of the left ovary was found that had undergone two complete turns. The right ovary was congested. Tumor was a cystadenoma. Recovery.

CASE 2.—Bornstein: Jour. Am. Med. Assn., 1909, liii, 1102. Age fourteen. Never had menstruated. Prodromal symptoms for three months. Then an acute attack with pain in right iliac region. Repeated vomiting and distention. The preoperative diagnosis was acute appendicitis. Operation. A large cystic tumor of the right ovary twice the size of a man's head was found. Twisted once. Recovery.

CASE 3.—Loving: Jour. Am. Med. Assn., 1908, l, 1350. Age six. Child previously well. Acute onset. Complaints were pain in the epigastrium and a pressing desire to urinate. Abdomen rigid and tender. Tumor in hypogastrium reaching to umbilicius. Operation. Large unilocular cyst of the right ovary twisted 1½ times. Measured 12.5 by 10.5 by 35 cm. Weight 640 grams. Recovery.

CASE 4.—Swainson: Proc. Roy. Soc. Med., London, 1909-10. iii. Sec. Stud. Dis. Child, p. 72. Age two. Complaints. Abdominal pain and vomiting for four days. Abdomen rigid and distended. Tumor in right iliac fossa. In the diagnosis, intussusception, tuberculous peritonitis and appendicitis were considered. Operation. Strangulated ovarian tumor the size of a tangerine orange. Type not stated. Recovery.

CASE 5.—Sutcliffe: Lancet, London, 1907, ii, 772. Age three. Violent abdominal pain and vomiting for one day. Tumor in middle of abdomen. Operation. Cocoanut-sized adenoma of the right ovary twisted four times was found. Recovery.

CASE 6.—Thellung: Cor.-Bl. f. Schweiz. Aerzte, Basel, 1908, xxxviii, 490-5. Age 8. Two attacks had occurred respectively 15 months and 3 months before the one leading to operation. Complaints. Pain in the right lower quadrant and vomiting of three days' duration. Tumor in iliocecal region and moderate rigidity. Preoperative diagnosis, perforated appendix with abscess and peritonitis. Operation. Small amount of blood tinged exudate. Fist-sized right ovarian cyst twisted once. Right tube and uterus also twisted, the latter at the level of the cervix. Recovery.

CASE 7.—Angus: Brit. Med. Jour., 1906, i, 199. Age six. Abdominal pain and vomiting for three days. Abdominal distention and dullness above pubes and in

Digitized by Google

right flank. Operation. Dermoid of right ovary the size of a duck's egg. Twisted 2½ times. Tip of appendix attached to the mass. Fell out of bed after operation and never regained consciousness. Death. Autopsy negative.

CASE 8.—Vineberg: Med. Record, 1915, lxxxvii, 586. Age nine. Complaints. Abdominal pain and vomiting. Rigidity and tumor mass to the umbilicus. Preoperative diagnosis. Twisted ovarian tumor. Operation. Large cystadenoma twisted two times. Recovery.

CASE 9.—Goldstine: Surg., Gynec. and Obst., 1920, xxx, 627. Age twelve. Had an attack two months previous to present one. Complaint, abdominal pain. Preoperative diagnosis. Ruptured appendix. Operation. Ovarian cyst twisted two times. Recovery.

CASE 10.—Hodgson: Univ. Durham. Coll. Med. Gaz., London, 1916, xvi, 104. Age eleven. Onset sudden. Complaint. Pain in right lower quadrant accompanied by vomiting. Mass felt in right iliac fossa, just above the pelvic brim. Rectal examination showed a mass in the pouch of Douglas. One previous attack about two weeks before present trouble. Preoperative diagnosis. Appendicitis with abscess formation. Operation. A dermoid cyst about the size of a cocoanut with a long pedicle was found which had become twisted. Recovery.

CASE 11.—Sourdat. Rev. Mens. de Gynéc. de Obstét. et de Pediat., Paris, 1912, vii, 131-133. Age 12. Complaint. Abdominal pain and vomiting of two days' duration. Abdominal tumor the size of a child's head. No ascites. Child's abdomen had been enlarging for more than a year and at times she had complained of vague abdominal pains. Preoperative diagnosis. Ovarian cyst with torsion. Operation. A dermoid cyst the size of an adult head and containing about two liters of straw-colored fluid, with a pedicle twisted one-half turn was found. Recovery.

CASE 12.—Eisenbuch: Gynäk. Rundschau, Berl., u. Wien., 1917, xi, 233:248. Age ten. Onset sudden without previous symptoms. Complaint. Abdominal pain followed by vomiting. Palpable tumor in the lower abdomen the size of an apple. Preoperative diagnosis. Twisted ovarian tumor. Operation. Small amount of ascitic fluid escaped. A hard, fist-sized dermoid tumor of the left ovary twisted 180° to the right was found. Recovery.

CASE 13.—Nagel: Zentralbl. f. Gynäk., 1912, No. 22, p. 714. Age five. The case was demonstrated before the Gynecological Society of Berlin as a twisted ovarian tumor. It was about the size of a child's head and there was beginning necrosis. The cyst was a dermoid.

CASE 14.—Roll: Abstracted by Eisenbuch. Age eight and one-half. Had attacks of severe abdominal pain at times for three years lasting up to 12 hours. Seemed to depend on bodily exertion. Usually disappeared after the bowels had moved. Finally pain persisted in spite of bowels having moved, and there developed the symptoms of a peritonitis. Rectal examination showed a movable tumor. Preoperative diagnosis. Twisted ovarian cyst. Operation. Peritonitis present. Left ovary kidney-sized. It consisted of a brownish black hematoma. Pedicle twisted three times from left to right. Right ovary small and cystic and larger than an adult ovary. Its infundibulopelvic ligament was 5 cm. long. Recovery.

CASE 15.—Roll: Abstracted by Eisenbuch. Age seven. A sister of the previous patient. For one year had similar complaint to that of her sister. Usual symptoms of torsion made a laparotomy necessary. Operation. The left ovary consisted of a necrotic hematoma. Right ovary was cystic and about twice the normal size. Recovery. In each of these two cases the right appendage was sutured to

Digitized by Google

the pelvic wall in order to prevent a repetition of the accident due to unusually long ligaments. In each case further examination showed the cysts to be dermoids.

CASE 16.—Selzer: Abstracted by Eisenbuch. Age eight. Complaint. Abdominal tumor. Preoperative diagnosis. Appendicitis or localized peritonitis. Operation. A left-sided ovarian dermoid was found with torsion of the pedicle. Recovery.

CASE 17.—Nagel: Ztschr. für Gynäk., 1904, liii, p. 580. Age eight. Complaint. For three days there was abdominal pain, vomiting and obstipation, accompanied by abdominal distention. For one year the child had abdominal pain at times and the parents noticed some increase in the size of the abdomen. Operation. A twisted ovarian dermoid the size of a child's head was found. Torsion of 180°. Recovery.

CASE 18.—Heaton: Brit. Med. Jour., 1901, ii, p. 1559. Age eight. Had several previous attacks of abdominal pain. Complaint. For five days lower abdominal pain, vomiting and tenderness in lower abdomen. Tender tumor mass in right iliac fossa. Operation. A unilocular cyst of the left ovary twisted 4½ times was found. Recovery.

CASE 19.—Askanazy: Abstracted by Eisenbuch. Age nine. Complaint. Abdominal pain. At operation a twisted dermoid cyst was found.

CASE 20.—Karazewski, A.: Medycyna, Warszawa, 1903, xxxi, 598:625. Age ten. Child constipated since birth. During the seventh year had quite severe pain in the left side of the abdomen, after a long period of obstipation. Some improvement after heat to abdomen and enemas. Child had repeated attacks of this trouble once or twice a week, pain lasting 5 to 10 minutes. In the three years previous to operation had three severe attacks. Finally while in school was struck in the abdomen by the elbow of another child. Next day complained of severe pain in the left lower quadrant. Enema gave a small amount of hard stool. Vomiting ensued and the pain became worse. Was given castor oil which resulted in a small liquid stool. Abdomen not distended. Considerable rigidity of the abdominal muscles. Distended coils of intestine were noted. Tenderness in the left lower quadrant. Preoperative diagnosis. Intestinal obstruction. Operation. Colon came into the wound as a sausage-sized mass, filled with fluid and the sigmoid was found to be twisted. The anus was dilated after the sigmoid was untwisted and yellowish foul-smelling fluid was evacuated per rectum. Above the symphysis lying against the abdominal wall there was a tumor of the left ovary which was twisted, the pedicle consisting of the tube and the broad ligament. Tumor was an ovarian dermoid. Removal. Recovery.

CASE 21.—Meigs: Boston Med. and Surg. Jour., 1900, Lancet I.* Abstracted by Eisenbuch. Age ten. No previous symptoms. The child fell from a box and later developed intense abdominal pain which increased in severity. Also showed signs of shock. The abdomen was tender and tympanitic. Preoperative diagnosis. Kinking of the ureter with hydronephrosis. Operation. Under anesthesia a tumor about the size of a child's head below and somewhat to the right of the navel was found. A dermoid of the right ovary twisted 1½ times was found and removed. Recovery.

CASE 22.—Owen, E., and Green, C.: Brit. Med. Jour., 1904, ii, 1517. Age ten. Complaint. Enlargement of the abdomen, abdominal pain and vomiting. Operation. Under the anesthetic the uterus was found to be displaced to the right and a tumor noted reaching almost to the umbilicus. A cocoanut-sized ovarian dermoid which was twisted 1½ times from the left to the right was found and removed. Patient's condition was good for five days and then she had a convulsion. On the

*Unable to find original reference

Digitized by Google

sixth day developed symptoms of a bowel obstruction and was re-operated. A piece of ileum was found adherent in the pelvis. It was released. Recovery.

CASE 23.—Freund: Zentralbl. f. Gynäk., 1919, iv, 76. Age thirteen. Onset sudden. Complaint. Severe pain in the lower abdomen, lasting three days. Developed peritoneal symptoms. Abdomen distended. Rectal examination showed a small anteflexed uterus and a left-sided tumor about the size of a child's head. Operation. Considerable blood in the peritoneal cavity and a large coagulum was found in the culdesac. The uterus was partially bicornuate. The right ovary was quite large. Right tube normal. On the left side there was an ovarian tumor with its pedicle twisted 2½ times toward the right. It was full of blood and about twice the size of an adult fist. The left tube was twisted with the ovary and there was some blood in the tube. Removal. Recovery.

CASE 24.—Christel, K.: Zentralbl. f. Gynäk., 1919, xliii, 302. Age five. Complaint. Severe pain in the abdomen and vomiting. Tumor palpated in the lower part of the abdomen in midline. Preoperative diagnosis. Twisted ovarian cyst. Operation. A right-sided ovarian dermoid with torsion of the pedicle was found. It was about twice the size of an adult first and infiltrated with blood. Recovery.

From a review of these cases, including our own, we obtain the following data. In age they range from two to fourteen. About 50 per cent occurred between the ages of eight and ten inclusive. The ovary alone was twisted in the majority of instances. In Case 6 the tube, ovary and the uterus to the level of the cervix were involved in the torsion. A volvulus of the sigmoid with intestinal obstruction was produced in one (Case 20). The type of tumor, dermoid, 15; simple cyst, 5; cystadenoma, 2; adenoma, 1. In two the nature of the tumor was not designated. It occurred nine times on the right side, with three others probably right; on the left nine times; four not given. Accordingly we have a proportion of about four to three in favor of the right side which corresponds roughly to Sanes'[9] figures on twisted tumors in adults (3 right to 2 left) and Anspach's[1] figures as to twisted tubal enlargements. In the majority of instances where it has been noted the torsion is in accordance with Küstner's law. This states that right-sided tumors twist from right to left, and left-sided tumors from left to right. The tumors varied in size from two reaching above the umbilicus to one the size of a walnut, one the size of a duck's egg, and our own about the size of an adult ovary. Opposite adnexa were normal in four cases; not mentioned in seventeen; stated to be congested in one; and in Case 23 the opposite ovary was described as "large." It is interesting to note that in each of Roll's cases occurring in sisters, the opposite ovary was cystic and there was an unusually long ovarian ligament. In both of these cases he sutured the remaining ovary to the lateral pelvic wall to prevent a similar accident upon the opposite side. The appendix was involved secondarily in two instances. In one the tip was attached to the pelvic mass and in the other it was somewhat edematous.

As regards symptomatology, there is little variation from similar

Digitized by Google

accidents occurring in adults—an acute abdominal crisis with pain, nausea and vomiting, prostration of varying degrees, tenderness, rigidity and distention, presence of tumor, increased pulse rate, temperature and moderate leucocytosis in cases where a blood count was made. These occurred variously combined and in different degrees as will be seen by looking over the case reports. It is to be noted the leucocytosis in such a crisis cannot be used to distinguish the case from one of inflammatory origin.

The occurrence of bladder symptoms in three cases of this series is rather interesting. Although there are innumerable instances of twisted ovarian tumor in the adult reported in the literature, Sanes[9] was able to find only nine cases that presented any bladder symptoms. He states that in five urination was painful and that in four it was difficult and frequent. The occurrence of these symptoms seems to be more frequent in children. In Case 1, the mother stated that the "urine had been cloudy for the past two days and that urination seemed painful." In Case 3 the attack was accompanied by a pressing desire to urinate and the patient was up all night trying to empty her bladder. In our case the patient had some pain on evacuating the bladder. It is common observation that many abdominal crises in children are attended rather frequently by disturbances of urination.

The diagnosis is difficult, chiefly because of the rarity of these cases and the similarity of their symptoms to those of other acute abdominal crises. The presence of a well-defined tumor is probably the most distinguishing mark that we have. A correct preoperative diagnosis was made in one-third of the cases. About one-third were diagnosed as acute appendicitis. In one case appendicitis, tuberculous peritonitis and cyst of the ovary were considered; in another kinking of the ureter with hydronephrosis; a diagnosis of intestinal obstruction was made in Case 20, and this was really present due to a volvulus of the sigmoid which complicated the torsion of the cyst.

We know of no way to estimate how frequently children with ovarian tumors suffer this complication. Such tumors in children are, of course, uncommon although Haubert* in 1911 collected two hundred of them from the literature. In his list there were 59 dermoids, a large proportion. In the 25 cases above reported 15 were dermoids.

The cause of torsion in children seems to be much the same as in adults and this has been thoroughly discussed elsewhere in the literature. However, it has been noted that this accident occurs frequently in association with the menstrual period, or during pregnancy and the puerperium and these factors are, of course, excluded in children.

The greater frequency of torsion on the right (3 to 2) Anspach[1]

*Quoted by Harrigan. For reference see Case 1.

Digitized by Google

thinks is due to the greater roominess of the pelvis on the right side by virtue of the sigmoid being on the left and to the fact that the peristaltic action of the cecum and small gut is greater than that of the sigmoid and thus adhesions about the right adnexa are broken up more readily. He believes that the strangulation of normal tubes is almost inconceivable, but is barely possible if there is an abnormally long mesosalpinx, one or two accessory ostia, or greater length and thickness of the tube than usual. He makes no statement relative to the possibility of torsion of a normal ovary. This is at least more readily conceivable and surely not so difficult of proof.

In view of the fact that the ovary in our case was found at operation to be about the size of an adult ovary, and undoubtedly had been materially increased in size by extravasation of blood due to its twisting, we have considered the matter of torsion of normal appendages (both tubes and ovaries) and have reviewed the literature of the same. The ovary had been made larger than the ordinary one of childhood by what we believe was a small follicular cyst (3.7 x 2.1 cm.), but this was hardly large enough to classify it as a distinct tumor. In considering the matter of torsion of so small an appendage one must, it seems to us, reckon with the length of the mesentery and the relative size of the ovary or length of the tube. The tube or ovary may be histologically what we deem well within the normal, and yet be mechanically predisposed to torsion. Norris has suggested that an unusually large, heavy ovary may pull away from its attachments far enough to produce a condition similar to a pedicle. Auvray in 1912 in a series of three articles in which he reported two cases and reviewed all of those reported up to that time, has presented the most complete exposition of this subject that we have been able to find. His report includes six cases of torsion of the normal adnexa in the nonpregnant state and three cases during pregnancy. One of these is possibly open to question (Case 2). Since that time five cases have been reported which are included in the summary below: namely, those of Barrington, Munroe (two), Johannson and Schweitzer. At the time of Auvray's article only one case had been reported in the American literature. This naturally gives rise to speculation as to whether we have not overlooked this condition. Since that time in our literature there has appeared the article of Munroe, in which he reports two cases of torsion of normal ovaries in girls of ten and eleven years. Munroe states that the size of the ovaries was that of a lemon or small orange. Since no histologic examination was made, it leaves some doubt in one's mind as to whether they should be included in this group. Since, however, he reported them under this title we have done so.

Herewith is presented a short résumé of the claimed cases of torsion of normal adnexa.

Digitized by Google

IN THE NONPREGNANT STATE

GROUP I. TUBE.

CASE 1.—Stark: Jour. Obst. and Gynec., Brit. Emp., 1911, xix, 258. Age forty-six. Unmarried. Menstruation still regular. Three attacks of lower abdominal pain, all occurring a day or two after cessation of menstrual flow. Examination showed an unruptured hymen and on the right side of the uterus a firm mass about the size of an ordinary tomato. No preoperative diagnosis made. Operation. Few free blood clots found. Left fallopian tube twisted from right to left three distinct and complete turns. Fimbriated ends filled with blood clots. Tube removed together with ovary which was normal. The mass removed from the right side was a separate tumor imbedded between the layers of the broad ligament. It proved to be a dermoid. Microscopic examination of the removed tube showed no evidence of pregnancy. Recovery.

CASE 2.—Auvray: Arch. Mens. d'Obst. et de Gynéc., 1913, ii, 97-104. Age twenty-eight. Virgin. Menstruation began at 13. Entered hospital with diagnosis of acute appendicitis. For two years had at intervals some cramp-like pains in the abdomen, mostly on the right side with a tendency to syncope. Present complaint. Right-sided abdominal pain and vomiting. The menses appeared on the third day of the attack. Vaginal examination was impossible. Operation. At the end of three weeks. Tip of the appendix was attached to the mass in the pelvis. The latter was the size of a mandarin orange. The ovary was normal and not involved in the torsion. The mass consisted of the tube twisted three times and distended with black bloody fluid. Pathologic examination showed some inflammatory changes including round cells and giant cells. These changes were considered secondary, but on the whole leave some doubt in one's mind as to the genuineness of this case. Recovery.

CASE 3.—McIlroy: Jour. Obst. and Gynec. Brit. Emp., 1910, xviii, 368. Age forty-six. Widow, 4-para. Complaint. Severe pain in left iliac region accompanied by sweating and collapse. Some prolapse of the uterus for past few years and menstruation had been irregular, the last period having occurred four months previously after an amenorrhea for one year. Mass noted in culdesac about the size of a large orange. Immovable and tender. Slight tenderness and rigidity in the left iliac region. Preoperative diagnosis. Incarcerated fibroid of the uterus and a tubo-ovarian tumor were considered. Operation. Left hematosalpinx with two complete twists was found. No free blood in the peritoneal cavity. The ovary was fibrous and was not involved. The opposite ovary appeared congested but otherwise normal. Recovery. Detailed pathologic examination failed to reveal any trace of chorionic villi or placental tissue.

CASE 4.—Schweitzer: Zentralbl. f. Gynäk., 1918, xlii, p. 25:33. Age twenty-one. Single. Never pregnant. Complaint. Severe pain in left lower quadrant, which subsided but did not entirely disappear. Five days later there occurred a more severe attack coming at the time of the menstrual period. Examination. On the left side near and behind the uterus was a tense tumor about the size of an apple which was not freely movable. Preoperative diagnosis. Left ovarian cyst with torsion. Operation. There were many adhesions about the tumor which was removed, leaving a healthy ovary. The tumor consisted of the left tube twisted two times to the left. The opposite tube and ovary were normal. The mesosalpinx, however, was about twice its normal length and the outer end of the tube reached downward far beyond the ovary. Recovery. Pathological examination. The tube showed only those changes which could be plainly accounted for by its torsion. The tube contained a dark reddish-brown fluid which was sterile. It had a rather long mesentery.

Digitized by Google

GROUP II. OVARY.

CASE 5.—Norris: Am. Jour. Obst., 1911, lxiii, 850. Age nineteen. Unmarried. Menstrual history negative. Onset three days before a period. While sweeping was seized with a sudden sharp pain in the right lower quadrant. Vomiting ensued. Was seen in half an hour and was in a state of partial collapse. Both recti were rigid, the right being more so. Hymen intact. Rectal examination. To the right and posterior to the uterus was a tense, fairly hard kidney shaped tumor about the size of a lemon. Preoperative diagnosis. Twisted ovarian tumor. Operation. The right ovary was about twice the normal size and twisted on itself 180°. The tube was congested and rotated about 40° in the same direction. No free blood. Salpingo-oophorectomy done. Recovery. Pathologic examination. This showed the tube to be normal. The lumen was patent and contained a little blood. The right ovary was 6 cm. by 2.3 cm. by 4 cm. No adhesions. There was a small cyst 4 mm. in diameter at the inner pole. This was a graafian follicle cyst. The ovary was densely infiltrated with blood. The appendix was normal.

CASE 6.—Barrington: Jour. Obst. and Gynec., Brit. Emp., 1916, xxvii, 141. Age thirty-eight. Married. 12-para. Developed a sudden pain in the abdomen while walking upstairs. This became quite severe and located in the right lower quadrant. Vomiting and diarrhea began in 15 minutes. Continued for 24 hours. On deep pressure tenderness was noted in the right lower quadrant. A mass was noted on rectal examination. Operation. An excess of clear fluid was found in the peritoneal cavity which was not blood-stained. Appendix normal. A tense, elongated mass was found behind the uterus on the right side at the bottom of the culdesac. This consisted of the right ovary and distal part of the right tube twisted on its pedicle one complete turn. No adhesions. The ovary and a portion of the tube were removed. The ovary was 6.5 by 3.5 by 3 cm. after hardening.

CASE 7.—Johannson: Nord. Med. Ark., Stockholm, 1917. L. afd., i, No. 4, pages 1-14. Age six. Eleven days before entrance had a short attack of pain in the right side of the abdomen. One week later a more severe attack with vomiting. Slight tenderness over the region of the appendix on deep palpation. No rigidity. Preoperative diagnosis. Acute appendicitis. Operation. Considerable blood escaped through the incision. Appendix normal. Right ovary enlarged four or five times and blue black in color. Its pedicle was twisted once, and part of the tube was also twisted. Opposite adnexa were normal. Right salpingo-oophorectomy was done and also an appendectomy. Recovery. Pathologic examination. This showed the tube to be swollen and edematous, but otherwise negative. The mesovarium was unusually long. Microscopically the ovary consisted of a complete hemorrhagic infarct and no details were possible. No cyst was present in the ovary. Considered a normal ovary previous to the torsion.

GROUP III. TUBE AND OVARY.

CASE 8.—Auvray: Bull. Soc. d'Obst. et de Gynée., 1912, i, 727-731. Age fourteen and one-half years. Virgin. Menstruation began at 13. No previous symptoms. Entered with the diagnosis of acute appendicitis. Complaints. Right-sided abdominal pain and vomiting. Menstruation began on the third day of the attack. Operation. After an interval of three weeks. The right tube was found twisted two times on itself. No trace of any adhesions. Tube and ovary removed. Recovery. Pathologic examination. The fimbria were agglutinated together and both the tube and ovary were infiltrated with blood. There was no trace of chorionic villi or placental tissue. The diagnosis was torsion of a normal tube and ovary.

CASE 9.—Cassidy and Norbury: Lancet, London, 1911, i, 98. Age eleven. Complaint. Acute abdominal pain confined to the lower abdomen and worse on the left side than on the right. Vomiting. Pain on micturition and defecation. Similar

Digitized by Google

attack about three months previously. Tenderness present all over the lower abdomen, but chiefly in the left iliac region. Rigidity of the lower recti. Rectal examination showed a mass in the culdesac a little to the left of the midline. Preoperative diagnosis. Appendiceal abcess. Operation. A little blood stained fluid in the pelvic cavity. The uterus, the right fallopian tube and the right ovary were normal. The left ovary was found to be twisted with the corresponding broad ligament and fallopian tube was also twisted several times. Tube and ovary removed. Recovery. Microscopic examination of the ovary showed only extreme vascular engorgement.

CASE 10.—Munroe: Jour. Med. Assn. Georgia, August, 1917, p. 169. Age eleven. Onset sudden with pain in the right lower quadrant, nausea and vomiting. Some rigidity. On the fourth day a mass was felt below McBurney's point. Temperature 101.5, pulse 120, preoperative diagnosis. Appendiceal abscess. Operation. Fifth day. Appendix distended and inflamed, probably secondarily. In the pelvis a black looking mass about the size of an orange was found which consisted of the tube and ovary twisted several times at the junction of the tube with the uterus. Tube and ovary removed. No gross abnormality. Opposite adnexa were normal. Recovery. No microscopic examination was made.

CASE 11.—Munroe: Ibid. Age ten. Gave history of previous mild attacks suggesting appendicitis. Complaint. Colicky pain in the right lower quadrant persisting for about nine days. Temperature 102°. Pulse 120. Lower abdomen somewhat rigid. Mass felt in the right iliac fossa. Preoperative diagnosis. Appendiceal abscess. Operation. Appendix was slightly inflamed and was removed. Below this a dark-colored mass about the size of a lemon was found. This represented the tube and ovary attached by a twisted pedicle to a very small uterus. Tube and ovary removed. Opposite adnexa were normal. No gross disease of tube or ovary. Recovery. No microscopic examination was made.

GROUP IV. DURING PREGNANCY.

CASE 12.—Aulhorn: Zentralbl. f. Gynäk., 1910, No. 16, p. 538. Age nineteen. Never previously pregnant. Three months pregnant at time of attack. Several weeks before had slight pain in right lower abdomen which became better after a time. Complaint. Severe pain in the right lower abdomen of two days' duration. Abdominal rigidity present. Vaginal examination showed a fist-sized tumor which seemed to be on the right side. Preoperative diagnosis. Pregnancy with pyosalpinx was considered to be the most probable one. Operation. In the right side of the pelvis was found a distended tube and a large ovary twisted 180°. Pathologic examination showed the tube to be distended with clotted blood. The wall of the tube was thickened by hemorrhagic infiltration. The ovary was densely infiltrated with blood, but otherwise negative. Recovery.

CASE 13.—Lecene: Ann. de Gynéc., July, 1912. Abstracted by Auvray. Age twenty-one, 2-para. Five months pregnant. Complaint. Had intermittent pain in lower abdomen since the beginning of the pregnancy. Suddenly developed pain in the right lower quadrant, diarrhea and vomiting. There was tenderness in the right lower quadrant and rigidity. Indefinite mass in this region. Preoperative diagnosis. Appendicitis. Operation. The right tube was found twisted on itself two times. Ovary not involved. Appendix negative except for old adhesions. The lumen of the tube was normal except for dilatation. The wall showed only hemorrhagic infiltration. Recovery.

CASE 14.—Hartmann: Ann. de Gynéc., 1898, 1, 167. Abstracted by Auvray. Age twenty. Complaint. Vomiting, pain in the right lower quadrant, distention and obstipation. Preoperative diagnosis. Acute appendicitis. Operation. Twenty-four hours after onset. The uterus reached to the umbilicus. On opening the

Digitized by Google

abdomen some fluid escaped. The right adnexa formed a hemorrhagic looking mass and were twisted one full turn. The tube was patent and normal except for infiltration of blood. The ovary was the size of an orange. It was infiltrated with blood which had not originated from a ruptured graafian follicle. Recovery.

A review of these cases yields the following data:

Eight of the fourteen cases, more than half, occurred before the age of twenty; four of them under twelve, and presumably before menstruation had been established. The two oldest patients were forty-six years of age. In five cases the tube alone was involved in the torsion; in eight the tube and ovary, although in three of these the most distal portion of the tube only, the ovary being the essential factor in the torsion; in Case 9 the tube, ovary and broad ligament. The torsion occurred on the right side ten times and on the left four. The opposite adnexa were normal in seven; described as congested in one; and was not mentioned in five. In one case there was a dermoid cyst in the opposite broad ligament and in another the mesosalpinx on both sides is stated to be unusually long. The symptoms were the usual ones of torsion already commented on in this article. One-half of the patients had had previous attacks attributed to incomplete torsion. More than one-half the cases were diagnosed as acute appendicitis. Of the three cases operated during pregnancy all went to term.

Excluding those instances which occurred before puberty and during pregnancy, five out of the seven remaining occurred in close relation to the menstrual period. This is striking and would seem to give support to the theory of Payr[8] who experimentally showed that venous congestion in a pedicle is conducive to torsion. This has been described at some length by Anspach.[1] Payr injected the veins of the pedicle of a spleen that had been removed from the body and was able to produce a torsion of 125°, which he attributed to the fact that the veins of a pedicle are longer and more flexible than the arteries and under the influence of passive congestion assume a spiral course and so tend to impart a twisting motion to the tumor.

The subject may be divided into three groups, (1) torsion of the tube alone; (2) torsion of the ovary (which usually includes a small portion of the distal part of the tube); and (3) torsion of both. The views of Auvray[2] on the subject of torsion of the normal tube are interesting. He inquires as to whether the rarity of the condition is apparent or real. Many instances of twisted hematosalpinx have doubtless not been subjected to a thorough and adequate microscopic examination. In both of his cases he has the word of the pathologist that there were no chorionic villi or placental remains found. The congestion and hemorrhage into the tube were considered as being due to the torsion. The examination must of necessity be very thorough in order to positively exclude an ectopic as it may be rather easily overlooked. In

Digitized by Google

Case 8, (Auvray) the patient was a virgin of fourteen years and the tube was open so that any possibility of previous hydrosalpinx could be ruled out. Eight of the eleven cases occurring in the nonpregnant were in virgins which eliminates ectopic pregnancy from consideration. On the other hand Anspach[1] is of the opinion that in such cases the tube is probably the seat of a hydrosalpinx before torsion and that it is converted into a hematosalpinx as the result of twisting. He believes that a hydrosalpinx in virgins and in cases in which there is no history of previous pelvic infection may be the sequela of a gonorrheal vulvovaginitis in childhood which persists in latent form until puberty and then produces involvement of the tube which is not recognized. Again he says it may be residual following an unrecognized salpingitis in the course of a febrile, especially the exanthematous diseases, or it may be due to an attenuated tuberculous infection. The question then as to torsion of a normal tube seems to remain an open one, and Auvray makes a plea for careful histologic examination in cases of twisted hematosalpinx.

The cases reported of torsion of the normal ovary are more susceptible of proof and it is very difficult to dispute the histologic evidence presented in these cases. As to why a normal tube or ovary or both should become twisted, Auvray is somewhat in doubt, but thinks that possibly all the causes which bring about torsion of tubal enlargements and ovarian tumors must be included. Abnormal length of the tube or of the mesosalpinx or mesovarium would certainly also be a factor. It is conceivable that a slightly enlarged and prolapsed ovary which we may regard in the strict sense as nonpathologic, could become twisted. Auvray believes that a spiral course of the tube, which is normally present in fetal life and may persist as a congenital anomaly in the adult to a marked degree may be a predisposing factor. Under the influence of the passive congestion of pregnancy or the menstrual period (and eight out of the ten cases after puberty so happened) he thinks that the tube may increase in volume, may twist still more and go on to complete torsion according to the theory of Payr. All this, of course, is merely speculation, and is impossible to prove. Perhaps further study of these rare cases will throw more light on the subject.

The torsion of normal adnexa in hernial sacs represents the final subdivision of adnexal torsion. Auvray[2] has summarized fifteen of the twenty cases reported by Damianos in 1905 and adds two other cases. Heineck[5] in 1912 collected five cases of torsion of the ovary and eighteen cases of torsion of the tube and ovary in hernial sacs from the literature of the preceding twenty years. This accident represents a true torsion, and must not be confused with a simple strangulation of the adnexa in a hernial sac. Heineck states that so far as he has been able to determine, torsion of the pedicle has been observed only in

Digitized by Google

congenital hernia of the inguinal type. Auvray states that it may occur at the time of the first appearance of the hernia, or in those already established. It is decidedly an accident of infancy. The oldest reported case was five years and the youngest one month. Almost all of them, with four or five exceptions, occurred during the first year. It is of about equal frequency on each side. Pathologically the same changes occur as in torsion within the abdomen.

The clinical picture presented is usually that of an atypical strangulated omental or intestinal hernia. Obstipation is usually absent, and the general condition in most cases is not so serious. Neither is the condition so inclined to be progressive or persistent. Lecene's case was not seen until the fifteenth day and Damianos' not until the sixteenth. One case was operated three months after the torsion occurred. Rectal examination may be of considerable assistance in the diagnosis in that in infants the internal ring can often be palpated by this method. In only one case were the adnexa in such condition that it was impossible to return them to the abdominal cavity. There was no operative mortality.

SUMMARY

1. Torsion of ovarian tumors is an uncommon occurrence in childhood, as shown by the fact that only 26 cases, including our own, have been reported in the literature since 1900.

2. About 50 per cent occurred between the ages of eight and ten.

3. Sixty per cent of them were dermoids.

4. The tumors varied in size from that of an adult ovary to one reaching above the umbilicus.

5. The symptoms are those of an abdominal crisis similar to that of the same accident in adult life, sudden abdominal pain, vomiting, a variable degree of prostration, tenderness, rigidity, distention, temperature, increased pulse rate, and the presence of an abdominal tumor.

6. The diagnosis is usually difficult, probably due to rarity. Appendicitis is often the preoperative diagnosis.

7. The causes are much the same as in adult life.

8. Fourteen claimed cases of torsion of normal adnexa have been reported to date.

9. Eight of fourteen cases, more than half, occurred before the age of 20; four under 12, and presumably before puberty.

10. The tube alone may be involved, the tube and ovary together, or the ovary may be essentially the offending organ.

11. A large percentage occur in close relation to the menstrual period.

12. Three are reported during pregnancy.

Digitized by Google

13. Some question still exists as to whether a normal tube can undergo torsion, but it seems to be proved that a normal ovary may do so.

14. Factors such as the length of the mesentery, the size of the ovary, and the length of the tube, must be considered as well as the histologic structure of the organ.

15. Torsion of adnexa in hernial sacs (apart from strangulation) is relatively rare. It occurs only in congenital inguinal hernias and usually in the first year of life.

BIBLIOGRAPHY

(1) *Anspach*: Am. Jour. Obst., 1912, lxvi, 553. (2) *Auvray*: Arch. Mens. d'Obstét. et de Gynéc. Par., 1912, ii, 1-22. (3) *Auvray*: Bull. Soc. d'Obstét. et de Gynéc., 1912, i, 727-31. (4) *Auvray*: Arch. Mens. d'Obstét. et de Gynéc., 1913, ii, p. 97-104. (5) *Heineck*: Surg., Gynec. and Obst., 1912, xv, 63-109. (6) *Kittel*: St. Barth. Hosp. Jour., London, 1919, 20, xxvii, 24. (7) *Payr*: Arch. f. klin. Chir., 1902, lxviii, 501. (8) *Payr*: Deutsch. Ztschr. f. Chir., 1906, lxxxv, 392. (9) *Sanes*: Am. Jour. Obst., 1915, lxxi, 76. (10) *Wiel*: Johns Hopkins Hosp. Bull., 1905, xvi, 102-9.

DISCUSSION

DR. BROOKE M. ANSPACH, PHILADELPHIA.—I have seen one case in a child of 12 with symptoms of acute appendicitis, who had menstruated once, in which the diagnosis was plain because she had a large doughy tumor occupying the culdesac of Douglas.

Whether a normal appendage may undergo torsion I think there is reasonable doubt, but as Dr. Smith has stated, the ovary may have an abnormal attachment to the broad ligament and then it may undergo torsion just as an ovarian cyst may undergo torsion. The tube may be much elongated and very much thickened at its outer extremity so that it presents a pear-shaped tumor, and that may undergo torsion. When these structures have undergone torsion, there are certain structural changes which are the result of hemorrhagic infarction, and it is difficult to say what the adnexa were like before torsion occurred. A number of years ago I collected a series of cases of torsion of enlarged tubes. Some of them were mistaken clinically for acute appendicitis. There was no previous history of pelvic trouble, and then the question arose as to what had been the original state of the tube, and it seems that a majority had been hydrosalpinges which by twisting had become hematosalpinges. In the explanation of certain cases of sterility in women, who have no previous history of pelvic trouble, it would be interesting if we had positive information as to how much influence the exanthemata and appendicitis occurring in childhood, and certain diseases in adult life, have upon the tubes, and how frequently they produce adhesions which close the outer ostium leading to sterility and hydrosalpinx. Since the severe epidemic of influenza in Philadelphia two years ago, many patients as you take their histories, declare that they were entirely well until they were stricken with influenza. The work of Rosenow and Davis who found metastatic infection of the ovary in cases of streptococcus sore throat is suggestive to say the least.

DR. HUGO EHRENFEST, ST. LOUIS, MO.—The case reported by Dr. Smith was operated on the suspicion that it was appendicitis. I am under the impression that the literature emphasizes this mistaken diagnosis as an important clinical fact. Most of these twists and torsions occur on the right side.

DR. SMITH.—Three to one.

Digitized by Google

DR. EHRENFEST.—This explains why in most of these cases the preoperative diagnosis is appendicitis.

DR. HIRAM N. VINEBERG, NEW YORK CITY.—Some fifteen years ago I was called by a physician to see a girl, 11 years of age, in whom the diagnosis of acute appendicitis had been made. The abdomen was enormously distended, and the doctor drew attention to that, and thought it was simply a flatulent distention. It was quite evident the child had a large ovarian tumor with twisted pedicle. The diagnosis was simple. In fact, the child was taken suddenly with severe pain which would account for the symptoms caused by a twist of the pedicle. I operated on this girl, and she made a smooth recovery. Since then she has married and has borne children.

I would like to ask Dr. Keene if he can give us an explanation of the fact that in most of these cases that have a twist of the pedicle there are bladder symptoms. It is almost a pathognomonic symptom. In addition to pain, there is frequency of urination. I have never been able to explain this symptom satisfactorily. Of course, in many of the cases, especially in dermoids, the tumor lies in front of the uterus, but there are, as a rule, no urinary symptoms until a twist of the pedicle occurs.

DR. FLOYD E. KEENE, PHILADELPHIA, PA.—The case that I reported was a twisted dermoid cyst lying in close proximity to the bladder. Bladder irritability is more common in dermoids than in the ordinary type of ovarian cyst.

The case I referred to in my paper was a twisted and infected dermoid cyst lying in close proximity to the bladder. Vesical irritability is more common with dermoids than with the other types of ovarian cysts due largely, I think, to the fact that they often lie anteriorly, thus impinging directly on the bladder wall and further, the well-known clinical fact that dermoids are prone to produce irritation in adjacent structures.

DR. CHARLES C. NORRIS, PHILADELPHIA.—I should like to place on record two cases of torsion in apparently normal ovaries. In one case the clinical history is incomplete. The enlarged ovary was about the size of an English walnut. The tube was edematous, the ovary was so densely infiltrated with blood that I could not determine much about it, even by histologic examination. There was neither macroscopic nor microscopic evidence of new growth in this ovary.

The other case, one of my own, showed a similar specimen, occurring in an adult, the left ovary being the one involved. There was no previous history of inflammation, except that an abortion had occurred some years before with some infection. There had been a period of apparently perfect health. The symptoms developed rapidly, and on seeing the patient, I inclined to the belief that she had a small ovarian neoplasm that had undergone torsion. The abdomen was rigid, and the adnexa could not be made out with any degree of certainty. On operation I found an edematous tube; the tube was not, however, twisted, but the ovary was twisted on its pedicle and densely infiltrated with blood. Histologic section showed nothing beyond a mass of blood and there was no evidence of a new growth.

Those cases bring up the question of the etiology of torsion. We all know that there are certain factors that bear a definite relationship to the torsion of ovarian neoplasms, namely, the size of the tumor, the irregularity of its shape, the length of the pedicle, the amount of intraabdominal pressure, the action of the diaphragm, the peristaltic action, etc. None of these factors, however, has a definite bearing on this type of lesion occurring in so-called normal ovaries. I doubt whether a normal ovary ever undergoes torsion, except when in a hernial sac, or when it is attached to some other structure. One well-known English gynecologist (I believe it was Dr. Bell) some years ago advanced a most interesting theory as to the cause

Digitized by Google

of torsion and which, perhaps, may have some bearing on this type of case. The ovarian circulation is extremely tortuous, corkscrew-like, as it were. The theory as advanced applied to neoplasms and not to so-called normal ovaries. If we can conceive of anything that will cause a partial blockage of the return circulation, the vein, having a thinner coat than the artery, would be the first to become compressed. This would cause congestion, the pumping of the blood into the adnexa by the patent artery would have a tendency to straighten out the tortuous blood vessels, and in so doing would twist the ovary.

Curiously enough, my case somewhat bears out this theory, since on the posterior surface of the broad ligament, corresponding to a point about where the ovarian vessels entered, there was a scar that appeared to me to be the result of a lesion that developed at the time of the abortion years ago, and it is conceivable in this case that the scar may have contracted and thus blocked off the return circulation from the ovary, the constant twisting of the ovary producing the lesion I have just described.

Digitized by Google

TORSION OF THE CECUM WITH REVIEW OF THE LITERATURE AND REPORT OF A CASE

By Sidney A. Chalfant, *M.D.*
Pittsburgh, Pa.

An abnormal mobility of the cecum and ascending colon is a prerequisite to the development of a volvulus in that part of the intestinal canal. This abnormal mobility has been thoroughly studied by Harvey,[1] who reports his findings in 105 autopsies in infants between birth and two years of age, and gives a most thorough review of the literature. He found an abnormal mobility of the cecum and lower two-thirds of the ascending colon in 13.3 per cent of his cases. This seems to be a rather low percentage, as the same writer quotes others ranging from 14 per cent (Piersol[2]) to 26 per cent (Treves[3]) and 31 per cent (Smith[4]). This abnormal mobility of the large intestine including also the descending colon is normal in the pronograde animals as pointed out by Morley,[5] who states, "that the fixation of the colon progresses, *pari passu,* with the adoption of the erect posture, until in an orthograde animal such as the chimpanzee, the fixation differs in no material degree from that in the normal human type."

The fusion of the peritoneal surface occurs in the later months of intrauterine life or in the first few months after birth. Connell[6] suggests that the failure of fusion may be due to a late rotation of the first part of the large intestine in which coils of the ileum prevented the apposition of the surfaces that usually fuse.

While a marked mobility is present in about 20 per cent of persons of all ages, in only 1 per cent, according to Wandel,[7] does this extend up to or beyond the hepatic flexure.

Bundschuh in 1913[8] reviewed the literature and found 110 cases including one of his own. Kohler[9] reported an additional case, Corner and Sargent[10] five, Satterlee[11] one and Morley[12] one, making a total of 118 and with ours, 119 cases that we have been able to find to date. Of these 119 cases, 23 were not operated upon and all died; of the 96 cases operated upon, 57, or 59 per cent, died, giving a total mortality of 80 out of 119, or 67 per cent.

Torsion may occur in one or two ways; first rotation on an intestinal axis in which the cecum is carried across the abdomen and lies in the splenic area, kinking the colon at the hepatic flexure; or second, rotation on a mesenterial axis in which the cecum, ascending colon, and more or less of the terminal ileum are rotated at the hepatic flexure. This was the nature of the torsion present in our case.

Digitized by Google

The symptoms of torsion of the cecum are apparently less violent than those of torsion of the sigmoid. They depend upon several factors, especially the amount of small intestine involved, the degree of the torsion, and the lapse of time before operation. In those in which the entire small intestine is involved, occurring usually in infants, the symptoms are severe abdominal pain, general meteorism, and collapse. Death occurs in from six to twelve hours from shock and hemorrhage into the paralyzed bowel, commonly without a diagnosis having been made.

In the more chronic cases there is, as a rule, a history of attacks of sudden pain in the upper abdomen, vomiting and constipation. These attacks occur more or less frequently over a period of years. The symptoms appear to be due to a partial torsion that corrects itself spontaneously. Finally, a more complete torsion takes place which, if not operated upon, is fatal.

In the early cases without damage to the intestine, simple detorsion, with fixation of the cecum and ascending colon to prevent a recurrence, is sufficient. In the later cases the same principles apply as in intestinal obstruction in general, relief of the obstruction, care for the damaged intestine and drainage of the bowel above the point of obstruction.

CASE REPORT

Mrs. M. W., age forty-nine, was seen August 3, 1919. Family history negative, except that her mother has carcinoma of the bladder at the present time. Patient had the usual diseases of childhood. There has been for many years a marked constipation, but no history of attacks of pain. Fifteen years ago she was operated upon by Dr. F. F. Simpson and the left side of a double uterus with the corresponding tube and ovary was removed. Her convalescence was normal. Puberty at thirteen; periods irregular until twenty-four years of age; since then they have been regular, of the 28-day type, lasting four to five days. Eighteen months ago she had a profuse and prolonged menstrual flow which amounted to quite a severe menorrhagia. Since then she has been bleeding irregularly and at times profusely. There has been no marked loss in weight and no bleeding from the bowel.

The patient's present illness began one week ago when, after eating a heavy meal, she had an attack of severe pain in the upper abdomen. This pain recurred frequently and for the past four days has been almost constant, but of varying severity, and has been confined to the epigastrium and right hypochondrium. For the first three days the bowels moved with the aid of laxatives and enemata, but for four days she has passed no fecal matter or gas. Four days ago she vomited for the first time and has vomited three times since, but never at any time anything suggesting fecal matter.

Examination showed heart and lungs negative. Pulse 80, and temperature 99.8° F. Abdomen markedly distended and peristalsis visible. There was no rigidity, but marked tenderness in the epigastrium and right hypochondrium. There was no evidence of hernia.

Vaginal examination showed the uterus enlarged to about twice its normal size and adherent to the right pelvic wall. There was some bleeding on examination. Nothing further could be determined on account of the distention of the abdomen.

This was thought to be a case of intestinal obstruction of a subacute type, low in the intestinal canal on account of the moderate symptoms, and vomiting coming on rather late in the course of the disease. As the history of uterine bleeding

Digitized by Google

for eighteen months and the presence of a large adherent uterus suggested strongly a late carcinoma of the fundus, it was considered that the obstruction was probably due to an adhesion of the rectum or lower sigmoid to the uterus, kinking it, or possibly to an extension of the growth to the intestinal wall constricting the lumen. An obstruction due to a band of adhesion following her former operation was also thought to be a possible diagnosis.

The patient was sent to the hospital for immediate operation. On account of the apparent nature of the obstruction and the length of time since the onset of the trouble, a high left colostomy was decided upon. On opening the abdomen just above the left anterior superior spine of the ilium the descending colon was found collapsed. Through this incision a greatly distended loop, apparently of the large bowel, could be felt on the right side, extending to or a little beyond the midline. A right rectus incision was then made and this distended loop of intestine, which proved to be the cecum, ascending colon and about eighteen inches of the terminal ileum was delivered. The obstruction was just below the hepatic flexure and was due to a rotation of 360° from right to left, of the large bowel with the involvement of about eighteen inches of the terminal ileum, and was complicated by a firm band of omentum which surrounded the intestine at the point of constriction. The omentum was divided and the torsion corrected. The pressure within the cecum was so great that the peritoneal coat along the longitudinal bands separated when the cecum was delivered from the abdomen. The pressure at once was greatly reduced and the color returned to the intestinal wall. After repairing the peritoneal coat of the cecum, the intestines were replaced and the abdomen closed hurriedly without drainage. No attempt was made to fix the cecum. Convalescence was complicated by an infection in the rectus incision and an attack of digestive disturbance at the end of two weeks, associated with pain in the upper abdomen, diarrhea, and slight elevation of temperature.

Since leaving the hospital the patient had several attacks of pain in the upper abdomen resembling, according to her family physician, gallstone colic. There was no uterine bleeding until two months ago. For three weeks it was quite profuse, and the patient was readmitted to the hospital. She had a moderate elevation of temperature and pain in the lower abdomen. After the temperature subsided we attempted to do a diagnostic curettage, but on dilating the cervix about three or four ounces of pus escaped. She has just recently been discharged in good condition.

This case is reported in order to point out the fact that torsion of the cecum, while a rare condition, does occur, and that it must be considered in making a diagnosis in obscure cases of intestinal obstruction. This is especially the case in patients presenting a history of obstinate constipation with previous attacks of severe pain in the upper abdomen.

REFERENCES

(1) *Harvey*: Ann. Surg., 1918, lxvii, 641. (2) *Piersol*: Quoted by Harvey. (3) *Treves*: Quoted by Harvey. (4) *Smith*: Quoted by Harvey. (5) *Morley*: Brit. Med. Jour., 1920, ii, 542. (6) *Connell*: Surg., Gynec. and Obst., 1913, xvi, 353. (7) *Wandel*: Mitt. a. d. Grenzgeb, d. Med. u. Chir., 1903, xi, 39. (8) *Bundschuh*: Beitr. z. Klin. Chir., 1913, lxxxv, 58. (9) *Kohler*: Deutsch. med. Wchnschr., 1918, xliv, 519. (10) *Corner and Sargent*: Ann. Surg., 1905, xli, 63. (11) *Satterlee*: New York Med. Jour., 1914, c, 851. (12) *Morley*: loc. cit.

DISCUSSION

DR. EDWARD A. SCHUMANN, PHILADELPHIA.—In order to save time, I will not touch on the very interesting clinical aspects of this condition, but direct attention very briefly to some of the causative factors underlying its production. I

Digitized by Google

believe that in these extreme mobilities of the upper colon there is always an arrest of development. In the first two months of intrautrine life there is present a funnel-shaped cecum and unrotated funnel-shaped openings. In cases in which the colon remains unrotated and mobile, there results an arrest of development of the gut in adult life. In the great bulk of cases, with marked mobility and failure of rotation of the colon, there is associated, on careful examination of the patient, some other evidence of arrest of development. In Dr. Chalfant's case there was present a mammalian bicornate uterus; in other cases there are noted characteristic mammalian teeth. These patients apparently then have certain atavistic tendencies. Other causative factors are well-known changes in the mesentery involved in the assumption of the upright position on the part of man. We also know that in the assumption of the upright position the mesentery, particularly the mesocolon, is compelled to support the weight of the descending colon, and in many cases the development of increased connective tissue and elastic tissue in the mesentery has not kept pace with the weight of the colon. I believe that is the chief cause of the frequent condition of ptosis and large, heavy bowel. Microscopic sections of a number of autopsy specimens of people dying of intercurrent diseases, who had ptosis of the colon, showed this distribution of the elastic and connective tissue of the mesentery. A contrast of this with the mesenteries of quadruped mammals, furnishes an interesting picture. There the mesentery has no connective tissue as it does not need it; there is no weight upon it.

Digitized by Google

VULVAL AND VAGINAL CANCER TREATED BY FILTERED AND UNFILTERED RADIUM EMANATION

By Harold Bailey, M.D., and Halsey J. Bagg, Ph.D.
New York, N. Y.

(By Invitation)

THE treatment of cancer by radium emanation, enclosed in minute glass tubes and implanted directly into the growth without any further filtration, was first suggested by Duane in 1908. Joly and Stevenson (1914) used this method and reported a series of cases so treated. H. H. Janeway standardized this procedure, using it in many types of cancer in various parts of the body. He also first made use of buried emanation as a prophylactic agent, following the dissection of lymphatic structures at a distance from the lesion. In tongue and mouth cancer, after treating the original ulcer, his procedure was to dissect the lymph glands of the neck and then imbed a number of unfiltered radium tubes. In 1919, he reported a series of five cases of vulval carcinoma treated by the implantation of unfiltered tubes, reinforced by filtered radium, held by dental compound on the surface of the growth.

When this method was first employed, the tubes varied from 2 to 5 millicuries in strength, and in a number of instances there was considerable sloughing and irritation of the treated areas. Bagg, investigating the action of various doses of radium on living tissues, when implanted in this manner, found that the amount of tissue affected was not exponential to the size of the dose, and that as a matter of fact, with doses from 1 to 4 mc. there was but slight increase in this area when the dose was increased by 100 per cent. However, the larger dose leads to a more intense necrosis in the tissue immediately adjoining the tube.

METHODS AND APPARATUS

1. *Filtered Radium.*—The filtered radium is applied according to the location of the lesion by one of three methods. These methods are described in detail in previous publications and they consist in the so-called "bomb," "block," and "dental compound" applicators.

In brief the "block" technic involves the use of 1000 to 2000 millicuries of radium emanation, filtered by either 2 mm. of brass or 2 mm. of lead, and ½ mm. of silver, and held from the skin by 4 cm. of wood. In the first part of our work, lead was used as a filter and the dosage was 3000 mc. hrs. Following the research of our Physical Department, it was found that such heavy filtration was unnecessary, and an equivalent dosage was determined with a brass filter which has resulted in a material saving of the available radium. The "block" is applied for radiating the local

Digitized by Google

lesion and both inguinal regions in vulvar cancer, and is used in six applications around the pelvic girdle in vaginal cancer.

In using filtered radium applicators for external lesions we follow the method devised by Dr. Janeway, which consists in using a 1 mm. platinum capsule held in position by dental compound. The dose is usually 350 mc. hrs., the applicator being placed on the surface of the lesion. This method was also employed in treating lesions of the anterior vaginal wall.

The "bomb" was used only for the vaginal lesions. One thousand millicuries of radium emanation, with a filter of 1 mm. of platinum, was used for one hour directly over the growth. This applicator is so constructed that side radiation is minimized, and the rectum and bladder are protected by a heavy filtration of lead.

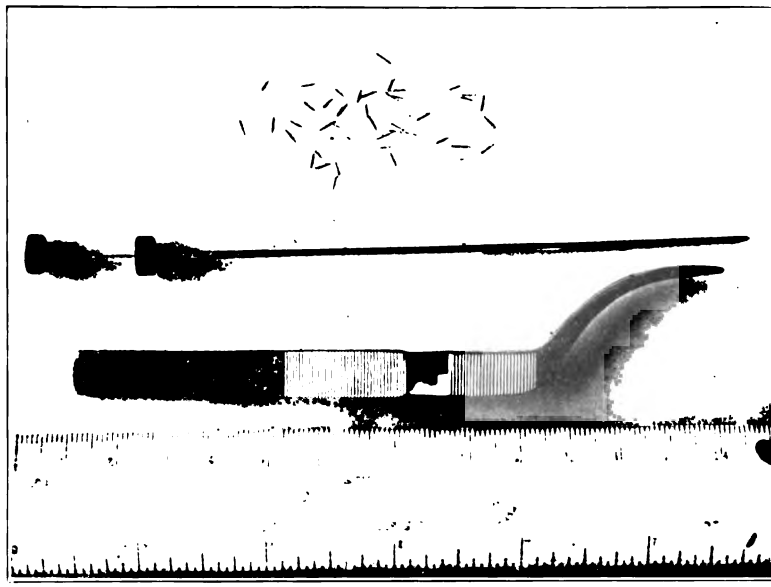


Fig. 1.—Bare tubes of radium emanation filtered only with 0.3 mm. of glass. Trocar and forceps; scale placed below shows the size of these instruments.

2. *Unfiltered Radium.*—The unfiltered radium is inserted into malignant growths by means of long steel trocars. The small glass tubes consisting of radium emanations are placed at the pointed end of the instrument, which is then thrust into the tissue and the trocar is slightly withdrawn, as the tubes are deposited by exerting pressure on the stylet.

EXPERIMENTAL RESULTS FOLLOWING THE IMBEDDING OF UNFILTERED RADIUM

The histologic structure of the tissue about the radium tubes implanted in animals is shown in Figs. 2 and 3. Fig. 2 shows the tissue reaction from a small tube containing emanation and left under the skin of an animal for seventeen days. The central excavated area was in the immediate proximity of the tube, about this was an additional zone showing

Digitized by Google

marked edema, some exudate, and less severe degeneration extending over a total area of 1 sq. cm. Fig. 3 was selected to show the marked leucocytic infiltration that is associated with the insertion of small doses of imbedded unfiltered emanation. The specimen was taken from the edge of a lesion experimentally produced in the brain of a living animal. At the right of the illustration is shown a portion of the central area of necrosis, surrounded by a sharply demarked zone of polynuclear leucocytes beyond which there is a wide area of hyperemia, and some edema of the pia. The ganglion cells near the necrotic zone showed marked hydropic degeneration and all the nuclei stained poorly.

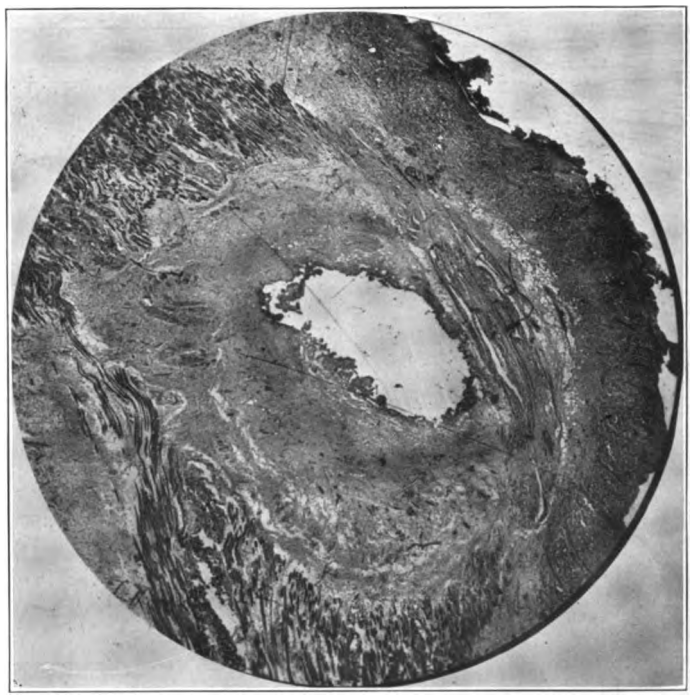


Fig. 2.—A bare tube containing 1.4 mc. of radium emanation was kept under the skin of a normal rat for 17 days. The open area in the center shows the location of the tube; around this area is a zone of complete necrosis and this in turn is surrounded by a zone of marked edema. The tissues show typical degeneration due to radiation. The area of destructive reaction is 1 cm. in diameter.

Figs. 4 and 5 show the reaction to imbedded radium in tumor in the human subject. Fig. 4 shows a myosarcoma of the vulva before treatment. Fig. 5 was from a specimen taken one week after imbedding of small doses of unfiltered radium. The histologic changes show typical radium effects. There is an increase in size of the cells with hyperchromatism and swelling of the nuclei and pronounced hydropic degeneration.

The localized reaction of the buried radium emanation is probably due to three reacting factors; first, the dispersion of the rays is increased the

Digitized by Google

greater the distance from the source, so that the more distant gamma ray effect is comparatively slight and less sharply defined than the more intense beta ray reaction immediately surrounding the tube. Second, as shown by the recent work of Quimby, the beta rays are largely absorbed by a few mm. of tissue; and third, the inflammatory reaction set up in the tissues in response to the radiation tends to localize the reaction. When strong tubes are used the area of tissue immediately surrounding the source of radiation is radiated for a longer time than is necessary to produce the death of the cells, and we believe that in most cases this is undesirable.

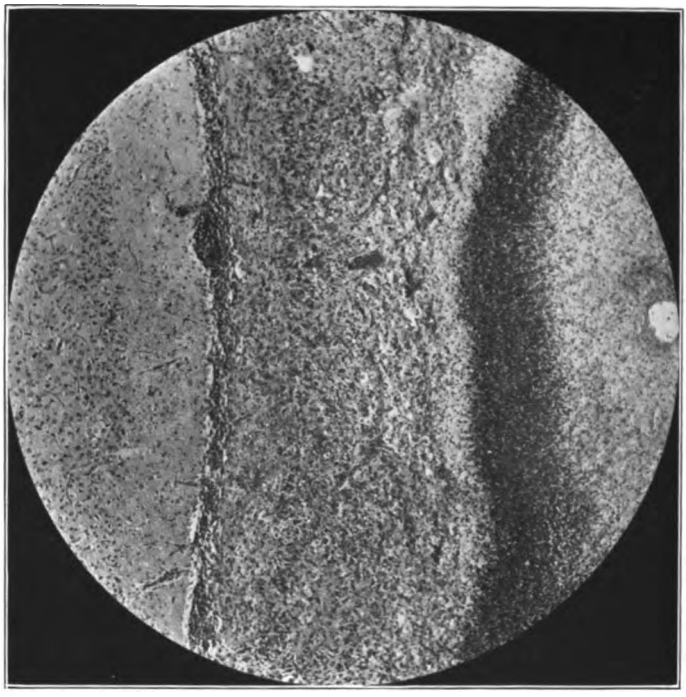


Fig. 3.—One and two-tenths mc. of emanation placed between the scalp and calvarium of a rat for 30 days. This is a highly magnified picture showing the periphery of the lesion produced in the brain. At the extreme right is an area of complete necrosis. The broad dark zone shows a dense leucocytic infiltration. In the middle of the photograph is a broad zone of hyperemia, sharply marked off from the area on the left where there is normal brain tissue.

CANCER OF THE VULVA

There have been 10 cases where the labia were involved, the lesion varying from round flat growths, 2 cm. in diameter to larger masses 1½ cm. thick and 7 cm. in the longest diameter. In most instances the lymph glands were affected. The pathological reports showed squamous cell carcinoma, with one exception, a myosarcoma. One of the cases developed a vulval tumor two years after she had appeared in the clinic for treatment for a recurrent cancer in the vaginal vault following a

Digitized by Google

hysterectomy. Although only short periods have elapsed since the treatments, there are several of the cases that have shown marked improvement and this fact has encouraged us to continue this technic.

Outline of Treatment of Vulval Cancer.—1. Radiating the primary lesion with filtered radium. 2. Radiating the groin on both sides with filtered radium. 3. Imbedding unfiltered tubes of 0.5 millicuries each, in the primary growth, placed ¾ of a centimeter apart. 4. Dissection of the groin, when necessary, with further radiation by means of buried emanation.

In our first enthusiasm with the method of imbedding many bare tubes

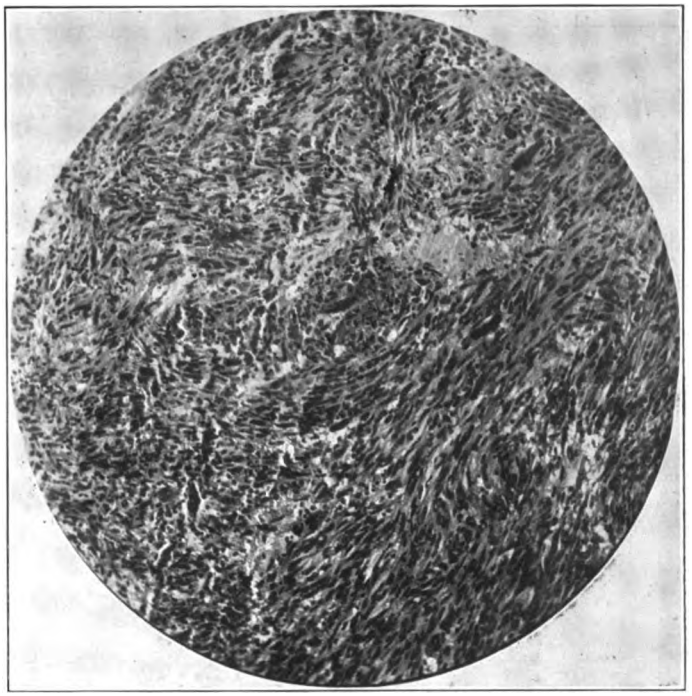


Fig. 4.—Sarcoma of the vulva. Cells showing mitosis and signs of active proliferation. Selected because in this case we were able to obtain a follow-up picture at the end of ten days.

of weak strength, we saw such regular and prompt retrogression of the ulcer that it seemed unnecessary to treat the lesion further. However, the marked and early involvement of the glands caused us to turn again to the primary ulcer. This was then treated with filtered radium, but recently the procedure has been reversed and the filtered radium is used first to avoid the possibility of spreading the disease by trauma at the time of the implantation of the tubes.

Treatment of the Ulcer.—In inserting the glass tubes, of approximately 0.5 millicuries value, the tumor is theoretically marked off into square centimeters, and 1 tube is placed in each area. In larger lesions,

Digitized by Google

5 to 7 cm. in diameter, it is well to implant the tubes along the edge of the growth at about ¾ of a centimeter distance, and leaving the needles in place, implant the remainder in parallel lines from the edges. The needle carrier is inserted as near as possible to the base of the ulcer; and before the radium is discharged, it is withdrawn slightly as the stylet deposits the bare tube.

All the cases should be seen after three weeks, and then it will be evident what areas, if any, have been untreated or ineffectively radiated. We find that a second treatment is usually necessary.

Treatment of the Lymph Nodes.—Although external radiation is usually considered as but feebly affecting glandular metastasis, we have

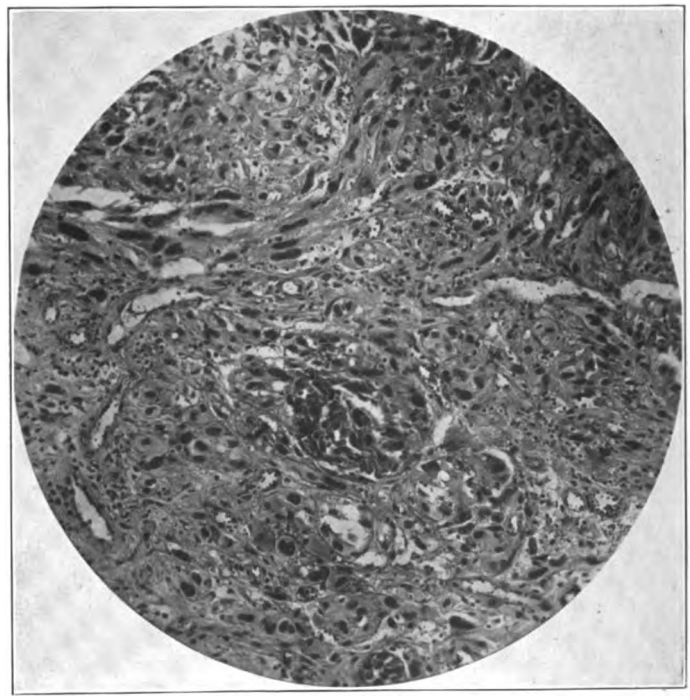


Fig. 5.—Same tumor as Fig. 4 but following radiation. Enlargement and pyknosis of the nuclei, loss of mitotic figures, vacuolation and leucocytic infiltration.

relied upon it to the extent of first treating the groins with a dose of 3000 mc. hrs., at a distance of 4 cm., with the lead "block" or with 2000 mc. hrs. with the brass "block." After a period of six weeks, or two months, if there is palpable involvement, the glandular areas are dissected on one or both sides. If the lesion is in the upper part of the vulva, the glands of both sides may be involved.

We have been satisfied with simple dissection of the inguinal chain with sometimes an additional incision over the femoral area. On removal of the glands, unfiltered tubes of 0.3 to 0.5 mc. each are laid 1 cm. apart, and if possible, also into the stump of the lymphatic chain. Bare

Digitized by Google

tubes* have been laid in glandular masses entering the femoral ring, and also in glands above Poupart's ligament. If the radium is not laid directly against the vessel, or into its lumen, tubes of 0.3 mc. apparently do not lead to erosion. There have been no secondary hemorrhages in this location and none within two months of such insertion directly through the vaginal vault. We have had but two primary hemorrhages in the pelvis from direct injury by the needle during the insertion, but these have fortunately been readily controlled.

Where the glandular metastasis has extended into the pelvis rather than to do such a radical dissection as in Basset's operation, we have

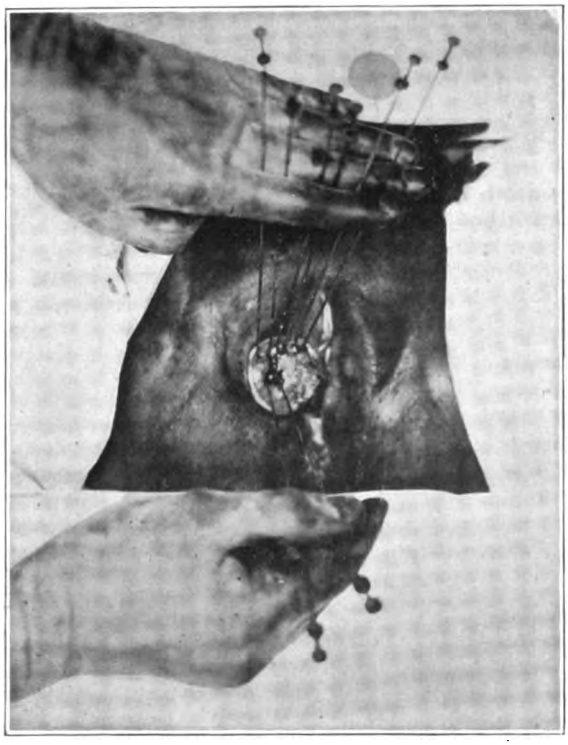


Fig. 6.—Carcinoma of the vulva. The tumor mass is divided into square centimeters and a tube is inserted into each.

relied upon the surface application of filtered radium for palliative purposes. There have been some cases that have required a second dissection of this region. As in surgery, the primary lesion is easily taken care of, but the lymph glands bring final disaster in many of the cases.

Of the six cases of this group that are still living the following are selected for purposes of showing the actual experiences with the technic.

1. *Vulval carcinoma, with lymph gland involvement, resulting in a complete retrogression of the original ulcer, and with the glandular areas held in check.* No.

*Bare tubes refer to radium emanation filtered by only 0.3 mm. of glass.

Digitized by Google

27088. Age thirty-nine. Microscopic examination of specimen showed epidermoid carcinoma. Hysterectomy in October, 1918. Vulval lesion noted the following June. Examination: Lesion of the vulva extending from the urethra two-thirds of the way to the fourchette. The inguinal glands on the left side are enlarged. Treatment: December 1, 1919, the lead block at 4 cm. distance for 2998 mc. hrs. Two days later, 7 bare tubes of 1 mc. each were imbedded in the vulval growth, giving a dose of 924 mc. hrs. February 24, 1920, 817 mc. hrs. were applied to the lesion by means of a 1 mm. platinum tube held in dental compound. One month later, the left groin was dissected and enlarged glands removed. Bare tubes of 0.5 mc. each were distributed throughout the wound, giving a total dosage of 462 mc. hrs. June 14, 1920, the right groin received a dosage of 2946 mc. hrs. by means of the lead block. December 29, 1920, there was no evidence of disease in the vulva and the glands showed no recurrence. May, 1921, the vulva showed no signs of cancer. There is a thick ridge of tissue in the groin.*

2. *Early primary cancer of the vulva, without palpable glandular involvement.* No. 27979. Age seventy-two. Microscopic examination showed squamous carcinoma. Growth preceded by itching of labia for a number of months. One year ago, a pea-sized lesion was noted in the vulva. Examination: There is a growth in the left labia minora, 2 by 3 cm. Irregular, hard, and with induration extending to the vaginal orifice. There is no palpable glandular involvement. Treatment: August 10, 1920, 26 bare tubes, totaling 5.7 mc. were imbedded in the lesion, giving a dosage of 752 mc. hrs. This treatment was repeated with a dose of 887 mc. hrs. on November 1, 1920. Five days later, the groins were treated with a dose of 2599 mc. hrs. by means of the lead block. At present, there is a small area of cancer tissue at the site of the primary lesion.

3. *Primary cancer of the urethra, with glandular involvement and with a retrogression in both areas, followed by late recurrence at the original site of the lesion.* No. 27016. Age thirty-one. Microscopic examination showed epidermoid carcinoma. A growth was noted four months before admission to the hospital. The lesion was not painful, but bled easily. Examination: The entire urethra on its lower walls is infiltrated by an ulcerating growth. The mouth of the urethra is split open and forms an ulcer of 1 cm. in diameter. There is glandular involvement of both groins. Treatment: November 10, 1919, both inguinal regions were treated with 2913 mc. hrs. by the lead block. The following week, 8 bare tubes of 0.6 mc. each, giving a total of 1056 mc. hrs., were placed in the local lesion. On January 5, 1920, 8 tubes were again imbedded in the lesion for a total of 243 mc. hrs. The tubes were 0.2 mc. each. May 10, 1920, two bare tubes, of 0.4 mc. strength, were placed in hard nodules beneath the urethra. On August 23, 1920, 10 tubes, of a total strength of 2.0 mc., and 2 of a total of 0.9 mc., were placed in the lesion around the external urethral meatus. At the same time 7 tubes of a total of 3.0 mc. were placed in the right groin after dissection, giving a total dose of 397 mc. hrs., and 6 tubes of a total of 2.6 mc. strength (340 mc. hrs.) were imbedded in the groin on the left side. Microscopic examination of the lymph nodes showed epidermoid carcinoma. In May, 1921, there was a recurrence of the tumor at the original site. Twenty bare tubes, averaging 0.45 mc. in strength, were placed in the lesion. the dose was 1212 mc. hrs. At the same time, a dose of 376 mc. hrs., in a 1 mm. platinum capsule, was held on the surface of the lesion by dental compound. At present there is a radium slough over the radiated area.

In this case, we depended entirely upon the use of unfiltered radium in the treatment of the primary lesion. We now feel that in all cases the

*At the time of reading this proof (November, 1921), six months after the paper was written, we found a recurrence in the right parametrium.

Digitized by Google

ulcers should be first radiated by filtered radium with a sufficient dose to affect outlying areas beyond the reach of the bare tubes implanted in the ulcer. The second point to be gained from the history of this case is the necessity of frequent observation even though the patient may seem to be cured.

CANCER OF THE VAGINA

Outline of Treatment.—1. Imbedding of unfiltered tubes of 0.5 mc. each, in the primary growth and placed about ¾ of a centimeter apart.

2. Filtered radium in the "bomb" applicator directed toward the growth.

3. Six external applications of filtered radium by means of the "block," reinforcing the radiation in the parametrium.

The two following cases are selected as typical of the lesions occurring in this location.

1. *Primary carcinoma of the vagina with no parametrial involvement, showing complete retrogression.* No. 26990. Age fifty-two. Specimen showed papillary epidermoid carcinoma. Examination: There is an annular growth, 3 cm. in diameter, on the posterior wall of the vagina, with the limits sharply defined.

Treatment: October 29, 1919, 6 bare tubes with a total dosage of 6.6 mc. and a value of 814 mc. hrs., were implanted in the tumor. One month later this was reinforced by 1040 mc. hrs. by means of the "bomb" applicator. February 11, 1921, there was a slight thickening in the posterior vaginal wall. May, 1921, there is no evidence of disease, and the vaginal wall is elastic.

2. *Primary cancer of the vagina, with parametrial involvement, and complete retrogression.* No. 27245. Age forty-one. Specimen showed squamous carcinoma. Examination revealed a primary growth on the posterior vaginal wall, 4 by 5 by 1 cm. in diameter, extending to the vault, but not involving the cervix. The rectal wall was free, but the right parametrium was thickened.

Treatment: January 16, 1920, 17 bare tubes, of a total of 5.9 mc., and a value of 779 mc. hrs., were imbedded in the growth. An external treatment over six places about the pelvic girdle, with a dosage of 2850 mc. hrs., was given by the lead block. Three days later, 1050 mc. hrs. were given by the "bomb" method, with the apparatus directed toward the lesion. Examination shows a slight bridge of tissue crossing beneath the mucous membrane. There was no evidence of cancer.

There were 18 cases treated by this method, and of these, 5 are alive and 4 are apparently free of the disease, although only short periods of time (the longest is 2 years) have elapsed since the treatment. All the growths were primary with two exceptions. These had recurrences in the lower, or first portion of the vagina, following hysterectomy for cancer of the uterus.

If the growth is localized on the posterior wall, a finger in the rectum aids in fixing the indurated area and facilitates the placing of the tubes. If the growth is on the anterior wall, one or two needles are inserted into the center of the growth, about ¾ cm. apart, and after discharging the emanation tubes, they are left in the growth and the shank of the needle is grasped, thus holding the entire area in position, while the remainder of the tubes are inserted. In the lower third of the vagina, the bare

Digitized by Google

tubes are reinforced by means of radium in platinum tubes, held in place by dental compound. In the upper and middle thirds, the filtered radium is given by means of the "bomb."

With but one exception, there have been no glandular enlargements of the inguinal region in the cases where only the vagina was involved by the primary growth. All the lesions were of the ulcerative type and were accompanied by underlying induration, which in a few cases extended into the parametrium and could be readily palpated through the rectum.

DISCUSSION OF RESULTS

Until Janeway had instituted the use of imbedded emanation in vulval cancer, the general opinion of gynecologists was that radium had no place in this field, and even recently we have seen a statement to this effect. From a study of the subject extending now for more than three years we must disagree with this opinion, for we know that the original lesion may be completely eliminated without loss of any considerable amount of normal tissue and with comparatively little pain.

We believe that the method outlined is an ideal one for destroying the primary lesion. There is a minimum opportunity for spreading the disease, especially if the insertion of the tubes is preceded by an application of heavily filtered radium, which tends to devitalize the tumor cells. Wherever possible, the radium tubes surrounding the lesion are inserted through normal tissue. It might seem at first thought that the cautery could accomplish as much and in a shorter time. It must be remembered, however, that the two reactions are dissimilar. The imbedded radium produces a prolonged, gradual, reactive inflammation which is effective in checking the extension of the disease.

The experience with various doses of imbedded unfiltered radium emanation has shown that if the tubes are of 5 mc. strength, the elimination of the tumor is associated with extensive sloughing and prolonged and serious discomfort; whereas the smaller dose of about 0.5 mc., accomplishes as much for the removal of the growth, and yet without sloughing and with little pain. Except in the most minute lesion, it is not possible to arrange the placing of the tubes so that all the cancer cells are effectively radiated. Filtered radium to further check the growth of the injured, or partly damaged cells, is necessary as an adjunct to the implantation of bare tubes in vulval and vaginal cancers.

REFERENCES

Janeway, H. H.: Surg., Gynec. and Obst., September, 1919, xxix. *Bagg, H. J.*: Am. Jour. Roent., 1920, vii, No. 2, p. 536. *Quimby, Edith*: Am. Jour. Roentg., 1920, vii, 492. *Joly and Stevenson*: Proc. Royal Soc. Dublin, May 1, 1914.

DISCUSSION

DR. FREDERICK J. TAUSSIG, ST. LOUIS.—I think the work Dr. Janeway and Dr. Bailey have done in the use of emanations in these cases is valuable. So far as the treatment of vaginal cases is concerned, I quite agree with this method. I

Digitized by Google

think, however, when it comes to vulval cases we must again analyze in what way radium is to displace surgery. Vulvar cases are more general in their indications than breast cancers because they metastasize early in the disease and accessibility to the primary lesion without surgery in the main is to be preferred. One group, however, I believe should be handled by radium, that group in which we have either cancer of the urethra or cancer of the clitoris close to the urethra, and in order to accomplish surgical excision it is necessary to remove a portion of the urethra. Anyone who has handled some of these cases for years afterward and replaces the function of the lost urethra knows the patient had better take her chances with radium than with surgical excision of the growth, because in radium treatment the function of the urethra is usually not lost. However, in all cases where the lesion is well away from the urethra, where surgical excision can be made widely, it is preferable to adopt it rather than radium. However, radium should be used in

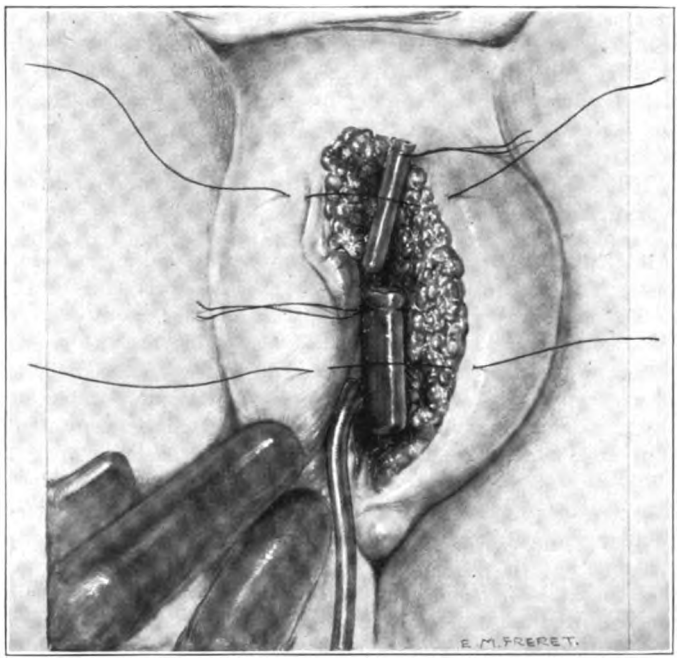


Fig. 1.—Dr. Ward's case of carcinoma of the vulva showing method of applying the radium tubes.

addition. It should be used before the excision to prevent implantation metastases, or as a prophylactic measure over the glandular region.

DR. GEORGE GRAY WARD, JR., NEW YORK CITY.—I show here an illustration of a case of carcinoma of the vulva that occurred in our service at the Woman's Hospital as illustrating the effect of radium and the method I used in employing this aid. The tubes screened with brass and rubber were placed *in situ* (as shown in Fig. 1) with sutures, a catheter being introduced into the bladder previously to permit urination to go on.

While the radium destroyed the disease locally, she survived only about six months, dying from metastases.

DR. FLOYD E. KEENE, PHILADELPHIA.—I have recently had occasion to follow up the cases of carcinoma that were treated by radium in Dr. Clark's service at the University Hospital. Of a total of 313 we have had 19 malignant cases involving

Digitized by Google

vulva or vagina, not including 6 cases of carcinoma of the urethra. Of these 19 cases, 2 were chorioepitheliomata. The other 17 were cases of carcinoma of the vulva or of the vagina. The cases of chorioepitheliomata were radiated and are alive and well between five and six years after the application of the radium. Of the cases of carcinoma or epithelioma of the vulva or vagina that are living, we have had four. Of that number, one is alive and apparently well. One is alive two and a half years afterward, one, one and a half years afterward, the third about three years afterward, and the fourth, four to five years afterward.

Among the fatal cases, of which there are thirteen, three had rectovaginal fistula. We have not had access to the large amounts of radium, such as Dr. Bailey has used, and our work has been limited to 100 milligrams of radium element, applying the radium in capsules or implanting it into the growth by means of needles. It is very essential for one to use extreme care in treating carcinoma of the rectovaginal septum. First, because of the immediate symptoms which may result, such as a proctitis or cystitis, and secondly, because of the danger of fistula incident to the destructive action of radium. Of the 17 cases of epithelioma of the vulva or vagina, we have had 3 fistulæ. In 313 cases I followed up, including all cancers, we have had 31 fistulæ. The incidence of fistula following upon radiation of epithelioma of the vagina is greater than that in carcinoma of the cervix or of carcinoma situated in other parts of the pelvis.

I should like to ask Dr. Bailey his opinion regarding primary excision of cancer, as well as the glands, with subsequent radiation.

DR. HAROLD C. BAILEY, (closing).—My views are quite in accord with those of Dr. Taussig in regard to urethral cancer. In one case the treatment is detailed. The woman had a carcinoma of the urethra, with an ulcer about one centimeter in diameter and splitting the meatus. She had also glands in the groin that were involved. That ulcer disappeared without any discomfort to the patient, and without any urinary trouble whatever, with the application of 8 tubes of nearly a millicurie each. Five months afterwards, as a prophylactic measure, the tubes surrounding this area were embedded two-tenths of a centimeter apart. The glands in the groin became larger and were then dissected out and tubes embedded in the area a centimeter apart, and at that time, which was nearly a year after treatment, further radiation was put in the nodular mass, which was one centimeter from the meatus. That patient then apparently was quite well. She was shown at a conference several months later and disappeared for five months. She again appeared the first time with the original lesion in full active sway. It is a rather interesting case.

As regards the use of tubes where only a small amount of radium is obtainable, I think the method brought forth by Dr. Ward is very ingenious, and we are in the habit of using radium laid directly against the lesion. We have never seen anything approaching a cure.

As regards the question of removing the local lesion by surgery rather than by radium, the point we wish to bring out in this paper is, that it can be readily done so far as we can see without any loss of tissue and without any sloughing. There is secondary contraction of the tissues coming on some eight or nine months later, but there is no loss of tissue and no sloughing. The only time when sloughing occurs is where a case is re-treated and tubes are embedded in the area in which the radium was previously placed.

Digitized by Google

THE CURE OF CYSTIC CERVICAL ENDOMETRITIS BY THE AID OF MULTIPLE SCARIFICATION

By Henry T. Byford, M.D.

Chicago, Ill.

CYSTIC degeneration of the cervix uteri is curable only by destruction of the degenerated glandular tissue. Cutting operations except in the advanced cases involve the removal of functionating mucosa. Deep or radical cautery does the same, although less extensively, and is followed by a more or less harmful cicatricial contraction and deformity.

When the cystic degeneration is limited to a part of the vaginal portion, or to small scattered areas, the desideratum is to destroy only the cysts and degenerating glands. Even when the cystic degeneration is quite extensive the patient may for pressing reasons insist upon trying treatment, or she may be a bad operative risk on account of diabetes, hyperthyroidism, heart lesion, etc. Hence there is a legitimate field for conservative treatment of chronic cervical endometritis with cystic degeneration, provided it can be made curative instead of merely palliative.

I have not had any experience with electro-puncture, although I believe that its efficient use would destroy more functionating mucous membrane than necessary. The ordinary local treatment, consisting in the puncture of follicles as they become palpable or visible and the application once or twice a week of tincture of iodine, usually results in failure unless it is continued throughout the remainder of the patient's menstrual lifetime, when Nature will come to the rescue by causing senile atrophy of the cervix.

The treatment I am advocating is not new. It consists in using the old treatment in a way that makes it efficient. It is a speeding up and intensification of the puncturing and local stimulation. The puncturing of follicles becomes a multiple deep scarification and the local stimulation becomes a semicautery. Instead of using the scarificator only when cysts are discovered, from fifty to a hundred punctures into the diseased area or areas are made at short regular intervals, viz., from once to twice a week. This not only evacuates follicles that cannot be felt, but it makes openings into the infiltrated area about the follicles into which the antiseptic and stimulating application can penetrate. The application is strong enough to destroy or cause atrophy of what remains of the epithelial cells in glands that are al-

Digitized by Google

ready seriously damaged by inflammatory action, but is not strong enough, as I apply it, to destroy functioning glands that are supported by an unobstructed capillary circulation.

The scarificator I use is bayonet-pointed and cuts in three directions, and thus leaves patulous openings for the escape of mucus and the penetration of the solution. The solution consists of one part of iodine crystals and glycerine and two parts of phenol. For an area of almost complete degeneration I double the relative amount of the iodine in order to obtain quicker and somewhat more radical results. The only place where the stronger solution can do harm is at the edge of the cervical cavity where the mucosa will become reinverted, and where we want to preserve the columnar epithelium.

The technic I employ is quite simple and can be carried out at the office. After wiping the vaginal fornices, cervix and cervical cavity dry with absorbent cotton I disinfect them with a 5 per cent solution of phenol in water. I then make five or six punctures into and about each retention cyst that can be seen or felt, and also into any red spots or areas that indicate destructive inflammation of glands or obstruction of follicles. I then press absorbent cotton firmly against the surface to express mucous plugs and stop the bloody oozing. Then with an applicator which is tipped with a tuft of nonabsorbent cotton I apply the solution freely to the scarified areas and to the mucosa both of the vaginal portion and the cervical cavity, and press the saturated tuft of cotton firmly against the parts in order to force the iodized phenol into the glandular pockets and punctured tissues. I arm the applicator with nonabsorbent cotton because it holds the solution better than the absorbent. A dry tampon is placed against the cervix for the patient to remove in a few hours. I sometimes begin the treatment by dilating the cervix slightly with a large sound. This not only stretches the mouths of the glandular pockets within the cervix but expresses much of the tenacious mucus. The treatment is repeated every three or four days until no cysts can be seen or felt. I then settle down to the following routine procedure once a week for three or four months. From fifty to a hundred or more punctures are made in the cystic area or areas followed by the application of the iodized phenol, with or without the previous passage of the sound. In this way the superficial cysts are destroyed and deeper ones become accessible, and it is possible to finally evacuate them and secure the penetration or absorption of a large amount of iodine. After all signs of inflammation and cyst formation have disappeared, I discharge the patient with directions to return at the end of three or four months. A few treatments may then be required for the cure of glands that had been infected or affected previously but which had not been in evidence.

Digitized by Google

The weaker solution seldom penetrates the glandular pockets of the unscarified cervical cavity in sufficient quantity to injure the epithelium and as the columnar epithelium of the parts exposed in the vagina must be destroyed or converted into the squamous variety it does no harm. The stronger solution is liable to raise a blister if not thoroughly wiped off before placing the tampon. I have had that take place a few times but without deleterious results. The leaving of medicated strips of gauze in the cervical canal or against the cervix is not I think as efficacious as the intermittent iodized phenol application, for the active septic stage has usually passed and an interrupted stimulation or semicautery rather than continuous antisepsis is called for.

This treatment is a protracted but not necessarily a tedious one. On account of the monthly interference of the menstrual period, the patient gets only three treatments a month, and is not even prevented from attending to her ordinary active duties on treatment days.

I do not know whether vaginal douches assist very much except in a cleansing or aseptic way. I usually order a strong solution of chloride of sodium or a 1/2000 solution of potassium permanganate or of zinc chloride once daily.

In conclusion, I wish to repeat that I am not advocating such treatment as a substitute for trachelorrhaphy or trachelotomy, but as an alternative in cases in which such operations are not available or advisable. It is the treatment of choice only in cases in which there is moderate cyst formation or in cystic degeneration confined to a limited area. My object is not so much to extend the field of local treatment as to increase its efficiency when it is employed.

Digitized by Google

ENDOCERVICITIS AND EVERSION AND THE NASAL CAUTERY TIP

By Robert L. Dickinson, M.D.
New York, N. Y.

THE present evidence of discontent with some of the end-results of our cervix surgery calls for a more careful adaptation of the particular operative measure to the particular cervix. It calls also for a consideration of the injuries and inflammations that can be rendered harmless and symptomless by treatment outside the operating room, and particularly for a reappraisement of measures other than operative.

One such measure is too little employed,—the delicate cautery used in the nose. It has a not inconsiderable field between the simple raw areas and catarrhs that respond to a couple of applications, and the major injuries that need hospital work. Even among the latter there are some cases so benefited by preliminary treatment that their surgery is simplified. In a number of instances where the patient has been obliged to postpone operation for a major condition of the cervix, and this palliative treatment was used to relieve symptoms, I found operation in the end unneeded because the healing was enduring and the inroll sufficient. Furthermore, any measure that will abbreviate office treatment and obviate the pelvic obsession of the chronic office habitué is to be welcomed.

As technic, this method is not to be classed with the clumsy Paquelin hospital operation of Hunner except in its effectiveness in proper cases. Therein it is all that Hunner claims.

The cases responding particularly to this treatment happen to be especially rebellious to others. The worse they are, the more they are adapted to the hot wire. These are:

1. Rough and extensive granulation, with eversion.
2. The cysts, superficial or deep (these recur sometimes after repairs).
3. Voluminous, adhesive mucous catarrh of the canal.
4. Gonorrheal free secretions, with thickened lining.
5. Between-birth erosion with laceration (recurring with each labor if sewed in the interim).
6. Patients whose physical condition precludes, or whose circumstances postpone, operation.
7. Marked endocervicitis in virgins (because the visits are few).

There are groups that belong to other methods, such as: those responding promptly to simpler measures, or very sensitive; catarrh with

Digitized by Google

pinhole external os, that calls for dilation; chronic infiltration about the internal os, requiring the dilator; edema, and edema simulating hypertrophy, that need depletion; congestions due to constipation and sex-function disturbance; and endocervicitis that is an expression of a general condition.

The type of outfit is of some importance. The finer the electrode, the better. The generator with the vicious spitting noise alarms patients. The hum of the ordinary motor is feared. It may and should be obliter-

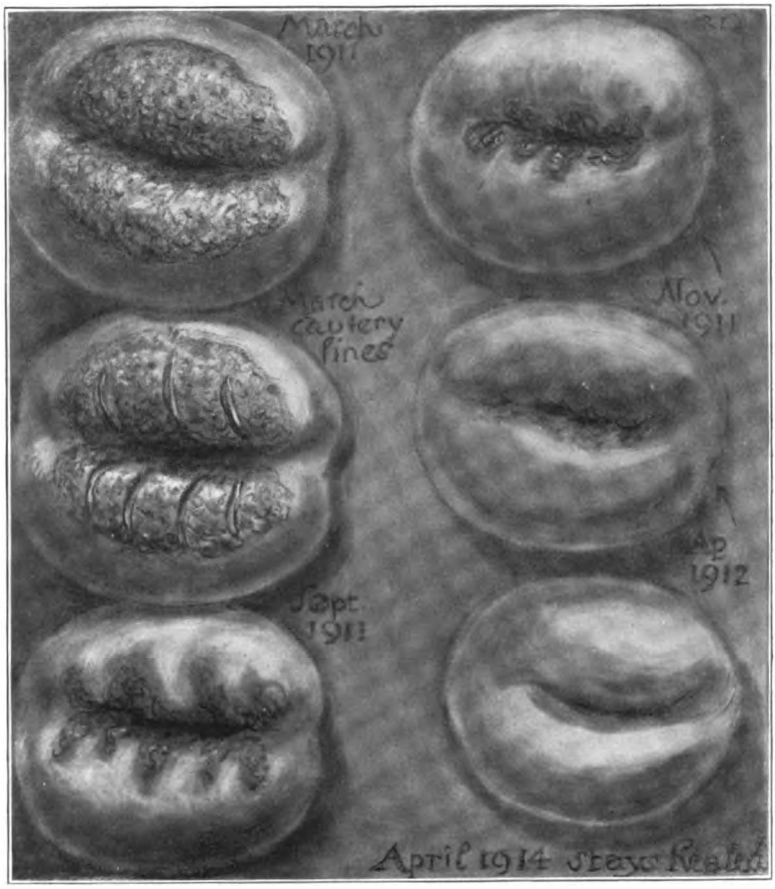


Fig. 1.—Laceration with eversion and granular surface, life-size. Cautery lines at first treatment. Absent for six months—demonstrating possibilities from single application. November shows effect of second treatment. A third in April gave the permanent healing, and shrinkage and inroll seen in lower drawing, so that operation was not required.

ated by hanging the motor in another room, or a closet, or, better, in the cellar.

On granular areas a tiny deep gutter is swiftly burned at ¼ inch intervals. For small areas punctures are made. Repetition once in 10 or 14 days is the average, two or three treatments sufficing. Progressive scar shortening does the inrolling later. Why the untreated intermediate strips

Digitized by Google

should heal I do not know. For erosion with edema, shrinkage with boroglyceride can precede cautery. Sticky secretion must be cleared away before the cautery is used. Narrow rough gauze twisted in the canal does this best, such as the discarded cut-off edges of gauze squares, or inch bandage. The wide gonorrheal canal is treated with two stripes, the narrow by punctures.

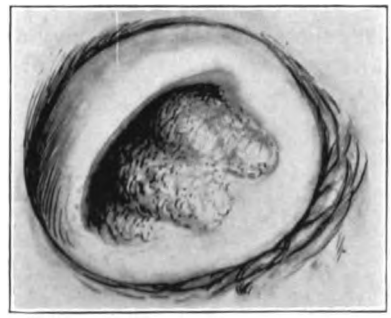


Fig. 2.—Chronic endocervicitis of intact virgin, with hypertrophy and eversion and granular surfaces. Shrunken and inrolled by single thorough treatment in office, using tiny Sim's speculum. (Life-size.)

As a temporary measure till childbearing is done with we find no infrequent need of this particular treatment. Aching and dysmenorrhea and erosion, one or all, may oblige us to consider repair, even though the condition is likely to be reproduced by the next delivery. Here is the substitute. Of course in the presence of a torn sphincter poorly united or a cystocele or a retroversion with symptoms and which no pessary will

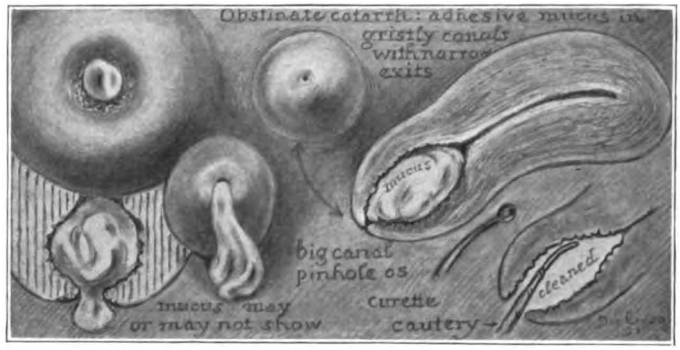


Fig. 3.—Aggravated catarrh of canal with distention and thickened lining. Reduced below life size, yet demonstrating the large amount of retained, inspissated mucus. The canal is cleared and the fine tip lays a stripe on opposite sides of the passage.

hold, cervix work would accompany other surgery. Or, if extreme, cervix damage is supposed to cause sterility. The point is that easy labor is favored by the open cervix and that our suture scar tissue may hinder dilation in labor,—even with some of our best results.

Obstinate adhesive catarrh behind a somewhat narrowed external os we had been in the habit of treating by stretching the opening and using

Digitized by Google

a tiny sharp curette on the canal (Craig or Delatour). The sensation imparted by the gristly lining of these long standing cases is as if one were scraping over the back of linoleum or Brussels carpet. This is the very condition for which the delicate cautery stripe works promptly. The canal is carefully dried out, the single tenaculum steadies it, and a longitudinal application is made on the two opposite sides of the wide oval passage. If necessary the side not touched may be striped two weeks later. Undue contraction, or tender scars have not resulted from any of these procedures. The conditions are quite different from the nose with its mucous membrane over bone.

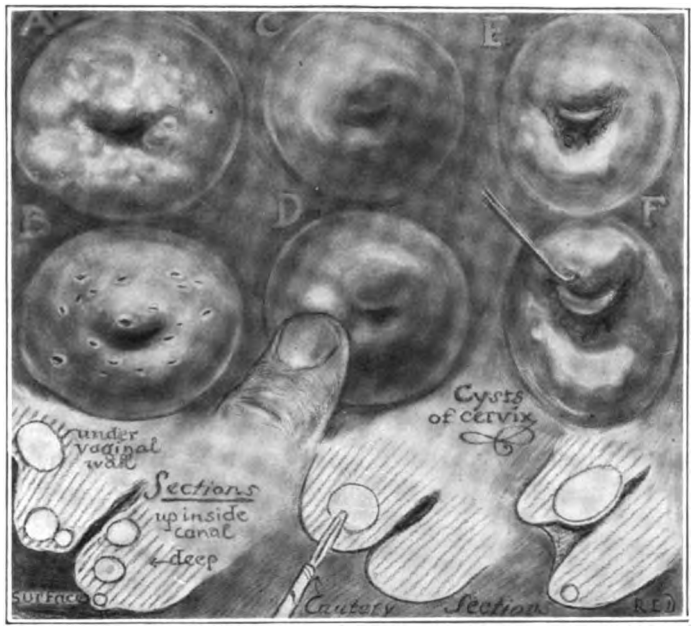


Fig. 4.—Cysts of cervix (reduced below life-size, as shown by size of finger). *A*, multiple cysts in various locations. *B*, Gaping openings left a few days after cautery puncture. *C*, Cervix without visible evidence of cyst, yet presenting to the finger the characteristic feel. *D*, the finger makes pressure and blanches the surface over the cyst, and the wire cautery tip at once stabs this spot, as the section shows. *E*, Cyst deep in canal. This is brought to view by tenaculum in *F*.

The cystic cervix is especially adapted to cautery treatment. There are some cervices so riddled with deep cysts that only complete amputation will relieve the pressure-ache. But even these are worth trying to cure with the fire-needle. Only, if one fails and desists, he must defer operation until the suppuration has entirely disappeared. The spear may cause a better depletion of a congested cervix, but its opening does not gape till granulation has closed the cavity, as is the case with the cautery puncture, and therefore the same pocket may fill again, if cleanly cut open. The cysts that the finger feels and the eye cannot find may be made visible by finger-tip pressure, quick exit of the finger, and a stab at the blanched spot that remains just long enough to reach. The ten-

Digitized by Google

aculum draws open the canal for interior nabothian distentions. For deep punctures the wire is to be very hot in order to keep on penetrating. In vascular and varicose womb mouths the wire should carry as little heat as possible—unless a decongesting ooze is desired. The amount of relief afforded by opening cysts is evidenced by the return of patients with the request that the old ache be eased. They recognize the recurrence of tension. The puncture is curative, the intervals of recurrence

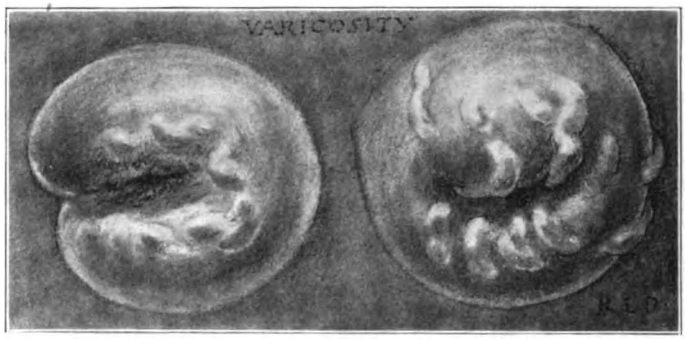


Fig. 5.—Varicosities of the cervix of unusual size treated with a low degree of heat in the wire.

lengthening from months to years. Cysts and cancer seem not to belong in the same cervix. Eversion is responsible for some erosion and irritation. The longitudinal cautery stripe inrolls the surface and relieves certain cases.

Polyps are best handled with the cautery tip if the stalk is accessible. If not, the fine wire loop works better. Varicosities of the

Fig. 6.—Cervical polyps (not life-size). Removed at base by hooked cautery wire slid up the stalk.

cervix are part of a general pelvic venous stasis and so of themselves of little moment. A swollen varicose cervix may "drag." In this case a low-heat puncture of any visible veins shuts them off and shrinks the cervix.

Objections. 1. Painfulness. One inflamed surface out of three or four is acutely sensitive. For these phenol in full strength to anesthetize, and Churchill's iodine after, are the considerate measures, but less

Digitized by Google

effective. 2. Unnecessary elaboration and cost. It is true that argentic nitrate in 10-16 per cent strength is the treatment for endocervicitis (except cystic forms) which we chose if restricted to a single measure. Polyps we can avulse, cysts we can puncture with the narrow eye-knife or Buttle spear. But the gynecologist cannot well dispense with the fine, cautery tip for other purposes, such as urethral caruncle, chronically infected urethral glands, and to stab the small hemorrhoid. 3. Noise and apprehension. The motor slung under the floor obviates these. It is said that frequent application of argentic nitrate in borderline cases favors carcinomatous change, whereas the cautery is the ideal remedy in case of doubt.

SUMMARY

Thin, deep cautery lines (or punctures) heal and inroll the granular, everted cervix, and furnish a successful substitute for operation in a considerable number of cases. This is the treatment of choice with patients who are poor operative risks. Also when deferring repair until childbearing is overpast. For the cystic cervix it is the chief remedy. With rebellious discharges from an enlarged canal, linear cautery does well. This, an office treatment, with the delicate nasal cautery tip, entirely replaces the old Paquelin technic.

Digitized by Google

END RESULTS OF AMPUTATION OF THE CERVIX AND TRACHELORRHAPHY

By Reginald M. Rawls, M.D.
New York, N. Y.

(From the Clinic of the Woman's Hospital.)

IT IS a far cry from the crude amputation of the cervix, with the ecraseur, to the finished surgical procedure devised by Sims and perfected by Emmet and the conservative trachelorrhaphy of Emmet. The technic of these masters has survived for a little over a half century and during this time there has arisen a considerable literature *pro* and *con*. Some writers refer to trachelorrhaphy as "uterine tinkering" and others hold that subsequent to amputation there is a high percentage of sterility and if by chance pregnancy occurs it is likely to end in abortion or premature labor or if it should go to term there will be more or less dystocia. A few even contend that, after amputation of the cervix, elective cesarean section is indicated in subsequent pregnancies. Such sequelae are unquestionable if cervix operations are performed without proper technic or indications.

Almost fifty-nine years ago Emmet[1] performed his first trachelorrhaphy, as he believed amputation of the cervix unnecessary except for removal of a cauliflower growth, malignant disease or excessive hypertrophy sometimes several inches in length. But after thirty-five years' experience with the operation, he states "for many years I held the opinion that it was possible, in almost every instance, by careful local and general treatment to restore in time the lacerated tissues to so near the normal condition that, when the operation (trachelorrhaphy) had been properly performed complete restoration would eventually take place with the result of bringing about involution of the uterus. But I am now of the opinion that there are exceptions to this rule, when it is better surgery to amputate a portion or the whole of the cervix provided the diseased tissues are completely removed and the wound treated in the manner I shall describe." This quotation gives us the indication for cervical repair of a quarter of a century ago as recognized by the originator of trachelorrhaphy and the man most capable of carrying out the technic.

Hirst,[2] Crossen,[3] Eden and Lockyer,[4] Anspach,[5] and Graves,[6] all agree on the indications for trachelorrhaphy but Anspach limits amputation to women past the childbearing period and Graves to procidentia. Others, including Sturmdorf,[7] question the efficacy of either procedure.

The most recent statistics of the postoperative results of amputation

Digitized by Google

of the cervix and trachelorrhaphy are those of Leonard[8] which are based on replies to circular letters received from 128 of 400 cases of amputation of the cervix, performed during the preceding twenty years, and from 39 of the cases of trachelorrhaphy, performed during the preceding ten years, in the Gynecological Clinic of the Johns Hopkins Hospital. The method of operation in this series of cases was either "almost without exception, a high amputation . . . from 2.5 to 3 cm. of the cervix above the external os being removed" or the classical trachelorrhaphy of Emmet. The indications governing the selection of the method of operation was almost invariably to amputate a cervix badly infected or one showing multiple lacerations and to use trachelorrhaphy in those cases presenting one or two more or less discrete lacerations and without a marked endocervicitis. Sturmdorf, after giving a summary of Leonard's conclusions says, "accepting these data from authoritative sources, as a correct exposition of facts, the obvious deduction is, that with chronic endocervicitis as the recognized pathologic indicator, trachelorrhaphy is an inadequate, and cervix amputation an injurious, operation."

To me it seems unfair to condemn the old and tried methods of cervical repair of Sims and Emmet and to recognize the newer and less tried tracheloplasty methods as a specific in all cervical disease. Especially is this true if we accept the statistics of Leonard for high amputation and apply them to all degrees of amputation. Thus the time seems ripe to study another series of cases of cervical operations and to compare the postoperative results of amputation of the cervix and trachelorrhaphy.

At the Woman's Hospital from January 1, 1916, to January 1, 1919, there were admitted approximately 6503 gynecological patients and alone or combined with other operative procedures 11 per cent had cervical operations. Amputation of the cervix was performed 461 times and trachelorrhaphy was performed 232 times. Two-thirds of the amputations and seven-eighths of the trachelorrhaphies were done on women under forty years of age, and were about equally combined with vaginal plastic and abdominal operations. This series is composed of 305 private cases and 394 ward cases performed by 41 individual operators. Two hundred eleven, or approximately 30 per cent, have been followed from one to five years. The technic of, and indications for, operation were those of Emmet more or less faithfully carried out, namely, to excise the diseased cervical tissue by a low, median or high amputation or to perform the classical trachelorrhaphy.

PLAN OF STUDY

To classify the cases and to find the immediate results the individual hospital records of the 693 cases were carefully gone over. The re-

Digitized by Google

mote or end results were obtained, from the ward cases, by writing to each patient to report to their follow-up clinic and when they did not report, a questionnaire was sent requesting that it be filled out and returned to the Record Department of the hospital. For the private cases, questionnaires were sent to their surgeons who were asked to return their end results with the privilege of using them in this report. In this manner 67 ward cases were re-examined by ten examiners and 75 returned complete questionnaires two and one-half to five years after operation. Among the private cases, 69 were re-examined by 17 operators from one to five years after operation. Combining these returns we have 136 cases re-examined from one to five years and our end results based on letters in only 75 ward cases. Included in these 211 cases, there were 132 amputations of the cervix and 79 trachelorrhaphies. Amputation was done in 81 patients under forty years of age and in 51 patients over forty years of age. Trachelorrhaphy was done in 74 under and in 5 over forty years of age. Seventy-three amputations and 33 trachelorrhaphies were done alone or were combined with other vaginal plastic operations, 56 amputations and 45 trachelorrhaphies had in addition some form of conservative abdominal operation, and three amputations and one trachelorrhaphy accompanied a bilateral salpingectomy. Approximately 64 per cent of the cases were re-examined, one to five years subsequent to operation. The personal equation of the author has been eliminated as he is merely the tabulator, in the great majority of the cases, of the findings recorded by a number of examiners. Further but 35.5 per cent of our end results are dependent upon answers to circular letters, as compared to 100 per cent in Leonard's series.

PATHOLOGY OF CERVICAL TISSUE REMOVED

About 67 per cent of the specimens of cervical tissue removed at operation was subjected to a microscopic examination including about 92 per cent removed by amputation and about 18 per cent removed by trachelorrhaphy. Approximately 76 per cent of the tissue specimens examined, showed cervical changes other than simple lacerations. This was present in cases of amputation in about 76 per cent and in cases of trachelorrhaphy in about 71 per cent. These changes, in their order of frequency were erosion, cervicitis, hyperplasia, endocervicitis, circulatory disturbance, precancerous changes, and carcinoma. It is most interesting to note that in 466 cases in which the tissue was examined microscopically, there was but one case each of precancerous change and carcinoma.

I. IMMEDIATE RESULTS

1. *Secondary Hemorrhage.*—There were 8 cases of secondary hemorrhage, or 1.2 per cent in our series. In none of these cases was it

Digitized by Google

necessary to resort to resuturing and in but one case was it necessary to use a vaginal pack, and in all but three of these cases there was subsequent primary union. Hemorrhage occurred on the second day in 2 cases, the sixth day in 1 case, the ninth day in 2 cases, and the twelfth day in 3 cases. Thus less than ½ per cent of the amputations (2 of 461) and about 2.5 per cent of the trachelorrhaphies (7 of 232) were complicated by secondary hemorrhage. The percentage of hemorrhage, but not the degree conforms with the earlier reported cases following trachelorrhaphy of Goodell and Emmet[9] rather than the more recent cases reported by Leonard. The latter in his study found six of 128 amputations severe enough to require resuture, or 4.7 per cent, and two of 39 cases of trachelorrhaphy which were controlled by vaginal pack, or 5.1 per cent. The low percentage for amputation in our series as compared to Leonard's, is possibly due to two factors. First, high amputation was the exception rather than the rule and, second, a vaginal pack was usually placed following all cervical operations. An interesting fact in this connection is that but three of these cases, all trachelorrhaphies, were followed by secondary or partial union which would seem to indicate that the hemorrhage was due to faulty hemostasis or errors of technic in tying the sutures which caused necrosis of the tissues rather than a sepsis from existing endocervicitis.

2. *Secondary Union or Partial Primary Union.*—In addition to the three cases of secondary or partial primary union, there were five cases of secondary or partial union or a fraction over 1 per cent (8 of 693). Four occurred after trachelorrhaphy and four after amputation, about 2 and 1 per cent, respectively. Three of the four cases of secondary or partial union in trachelorrhaphy were subsequent to secondary hemorrhage, and one of the four amputations in which secondary or partial union resulted was a case in which an extensive vaginal section was also done. In none of the cases was there a serious sepsis which in any way contributed to the mortality in this series of cases.

II. REMOTE OR END RESULTS

1. *General Health.*—The influence of cervical operations on the general health is a complex question and one that must be almost entirely analyzed from a subjective basis. This is necessarily the case as primarily the patient must be relieved of the symptoms for which she sought operation. A review of the following table shows that trachelorrhaphy alone gives a little over 16 per cent greater improvement in the general health than amputation alone. On the other hand, amputation when combined with vaginal plastic operations gives almost 21 per cent greater improvement in the general health than trachelorrhaphy combined with vaginal plastic operations. When

Digitized by Google

combined with abdominal operations, the difference for the two methods is negligible as they both show improvement in over 86 per cent. The discrepancy in the end results of amputation and trachelorrhaphy alone when contrasted with the results when they are combined with vaginal plastic measures seems to be explained on the theory that in the cases requiring amputation the primary injury also caused lesions in the vagina which should have been repaired to relieve the symptoms and thus improve the general health. Thus our statistics indicate that both methods improve the general health but the greater improvement results from amputation when combined with plastic repair.

TABLE I

INFLUENCE OF AMPUTATION AND TRACHELORRHAPHY ON THE GENERAL HEALTH

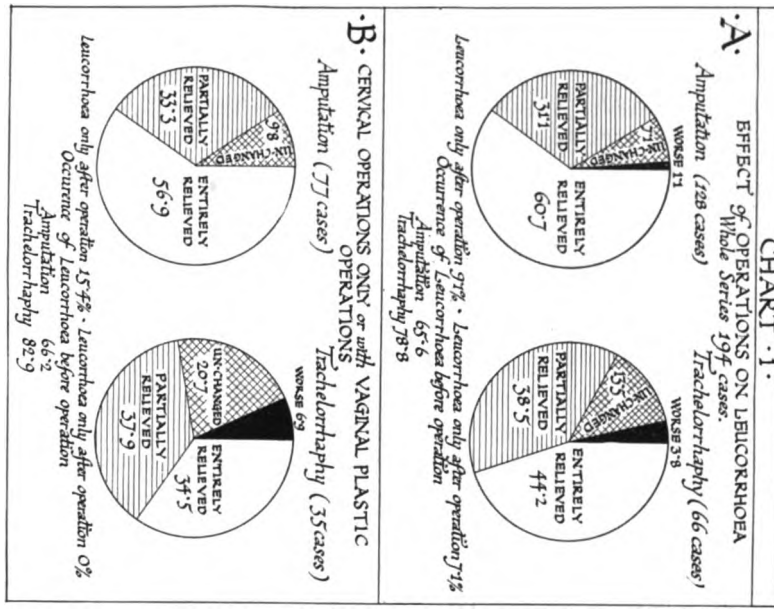
OPERATION	NUMBER OF CASES	NUMBER OF CASES IMPROVED
Amputation	12	8 (66.6%)
Trachelorrhaphy	12	10 (83.3%)
Amputation and vaginal plastic operations	48	42 (87.5%)
Trachelorrhaphy and vaginal plastic operations	21	14 (66.6%)
Amputation and abdominal operations	53	47 (86.8%)
Trachelorrhaphy and abdominal operations	48	43 (89.6%)
Totals—		
Amputation	113	97 (85.8%)
Trachelorrhaphy	81	67 (82.7%)
	194	164 (84.5%)

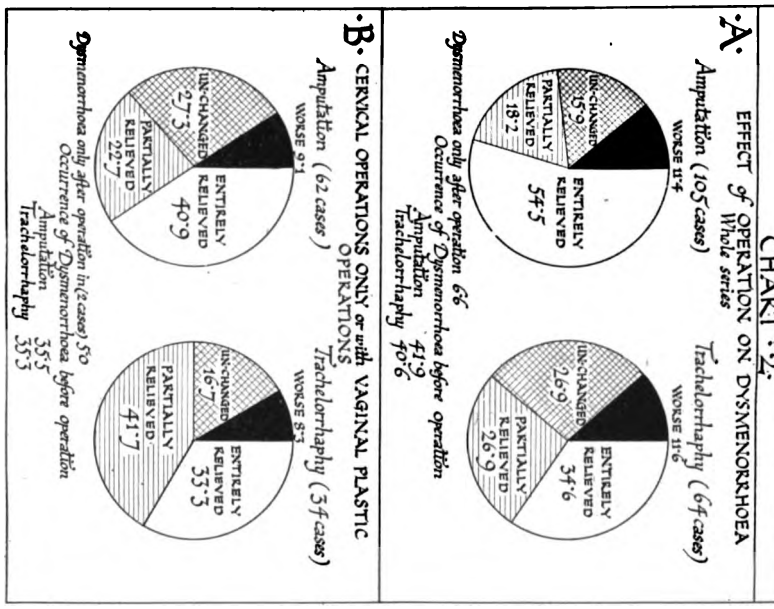
2. *Leucorrhea.*—The most frequent cause of persistent vaginal discharge is cervical disease and in the multiparous woman the predisposing cause is cervical laceration. On this basis it is interesting to determine, in our series of cases, the occurrence of leucorrhea before operation and its degree or cure after operation (see Chart 1).

In 194 cases of cervical operations a leucorrhea more or less constant and of varying degrees occurred in 70.1 per cent, before amputation in 65.6 per cent and before trachelorrhaphy in 78.8 per cent. To determine accurately the end results for leucorrhea requires examinations made from time to time but unfortunately, in most of our cases, the end results are based on one examination made from one to five years after operation. The discharge present may be due to a reinfection of a cervix restored to the normal by operation or the discharge may have eventually disappeared notwithstanding. This applies equally to both methods of operating; it seems reasonable to assume that any difference in the end results would be due to the form of operation.

Subsequent to amputation the leucorrhea was entirely relieved in 60.7 per cent and partially relieved in 31.1 per cent as compared to trachelorrhaphies with subsequent entire relief in 44.2 per cent and

Digitized by Google





partial relief in 38.5 per cent. As to the character of the existing leucorrhea after amputation it was unchanged in 7.1 per cent and worse in 1.1 per cent and for trachelorrhaphy it was unchanged in 13.5 per cent and worse in 3.8 per cent. In cases without leucorrhea before operation, it was present in 4 of 44 cases, or 9.1 per cent, for amputation and in 1 of 14 cases, or 7.1 per cent, for trachelorrhaphy.

Digitized by Google

If we exclude cervical operations combined with abdominal section which show an almost equal percentage of improvement for each method of operating (94.0 compared to 95.6), there will remain cervical operations alone or combined with vaginal plastic operations. From this series, cervical operation being the principle cause of the change in the vaginal discharge, we obtain definite end results. Therefore for amputation with existing leucorrhea in 66.2 per cent and for trachelorrhaphy with existing leucorrhea in 82.9 per cent, there was for amputation, contrasted with trachelorrhaphy, 22.4 per cent more complete relief (56.9 compared to 34.5) but 4.6 per cent less partial relief (33.3 compared to 37.9) and 10.9 per cent fewer cases in which the leucorrhea was unchanged in character. On the other hand, following amputation no cases were made worse whereas following trachelorrhaphy 2 of 35 cases, or 6.9 per cent, were worse. But 4 of 26 cases, or 15.4 per cent, of the cases subjected to amputation who were free of leucorrhea now had a mild degree of vaginal discharge.

Finally, amputation of the cervix is more efficient than trachelorrhaphy in the cure of leucorrhea, but more often than trachelorrhaphy causes a leucorrhea in cases previously free from a vaginal discharge. Such end results are not surprising even if we accept the theory that endocervicitis is the principal cause of leucorrhea. For it is unreasonable to assume that in every case of leucorrhea all the cervical glands, from the external to the internal os, are diseased. Therefore, as demonstrated by our series of cases, there is a place even in the treatment of leucorrhea for low, medium and high amputation and to a lesser degree for trachelorrhaphy. The end results further demonstrate the necessity for careful study of the indications and the performance of proper technic or too small an external os will result or some of the diseased glands will be left and the vaginal discharge will be worse in character or it will occur in cases free of leucorrhea before operation.

3. *Dysmenorrhea.*—In the nullipara, malformation or disease of the cervix is recognized as a causative factor of dysmenorrhea, but in the multipara laceration and its accompanying disease has received but scant attention as a cause of dysmenorrhea. However a review of Chart 2 of cervical operations shows an existing dysmenorrhea in 41.4 per cent; for amputation in 41.9 per cent and for trachelorrhaphy in 40.6 per cent.

Subsequent to amputation there is entire relief of dysmenorrhea in 54.5 per cent and partial relief in 18.2 per cent as compared to trachelorrhaphy with entire relief of the dysmenorrhea in 34.6 per cent and partial relief in 26.9 per cent. The degree of remaining dysmenorrhea was, for amputation, unchanged in 15.9 per cent and worse in 11.4 per cent as compared to trachelorrhaphy with the pain unchanged

Digitized by Google

in 26.9 per cent and worse in 11.6 per cent. However, in cases free from monthly pain before operation it was subsequently present only after amputation in 6.6 per cent.

If we deduct the cervical operations combined with abdominal section, which give for amputation 31.8 per cent more entire and partial relief of the dysmenorrhea than trachelorrhaphy there remain cervical operations alone or combined with vaginal plastic operations. Thus for amputation contrasted with trachelorrhaphy with about an equal percentage of existing dysmenorrhea (35.5 compared to 35.3) there was for amputation 7.6 per cent more entire relief from the dysmenorrhea (40.9 compared to 33.3) but there was 19.0 per cent less partial relief (22.7 compared 41.7). Therefore while trachelorrhaphy gives more cases with an improvement of the dysmenorrhea yet amputations give more cures of this symptom. Of the unimproved cases amputation contrasted with trachelorrhaphy gives 10.6 per cent more cases with the dysmenorrhea unchanged in character (27.3 compared to 16.7) but for each operation there is about the same percentage of the cases (9.1 compared to 8.3) in which the character of the pain was worse after operation. However, only after amputation in 40 cases free from dysmenorrhea before operation it was now very severe in 2 or 5 per cent.

Finally amputation, as compared with trachelorrhaphy, is more efficient in the cure of dysmenorrhea but both operations cause the existing pain to be more severe in character in from 8 to 11 per cent of the cases and amputation alone causes subsequent dysmenorrhea in from 5 to 6 per cent of the cases previously free from menstrual pain. Thus there is the necessity for careful study of the individual case and the application of the proper operation and technic for each case or the external os may be made too small or the cervical canal may become stenosed. For amputation the increased dysmenorrhea may be due in part, as has been held by some writers, to the scar which is perpendicular to the long axis of the cervical canal and by contracting may cause a narrowing of the canal. This was probably the condition in the following history of one of the two cases of amputation in which dysmenorrhea was present only after operation.

Mrs. H. was operated upon by a divulsion and curettage, with dull curette, and the cystic portion of the cervix was excised and the raw edges were coapted with chromic gut sutures, four being used as canal sutures, uneventful recovery, no secondary hemorrhage or unusual vaginal discharge. On discharge from the hospital there was no eversion of the cervical flaps and there was primary union. Some time later, because of severe dysmenorrhea the cervical canal had to be dilated and a stem pessary introduced. Thus the dysmenorrhea was eventually cured.

4. *Sterility.*—Many factors have to be considered in determining the cause of sterility. Duncan[10] has shown that the age at marriage and

Digitized by Google

the number of years married must be taken into account in our final analysis.

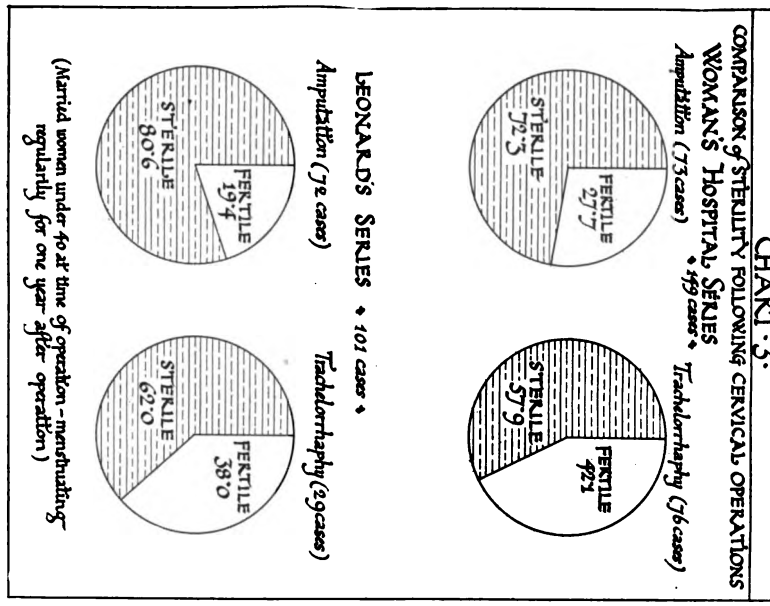
Unfortunately, successful operations on the cervix and vagina often produce increased voluntary sterility. The most frequent cause is the fear, held equally by the patient and her medical adviser and many times by the gynecologist and obstetrician, that labors subsequent to successful plastic operations will result in conditions as bad or even worse than those from which the patient had been relieved. This fear of bearing children, after operation, is shown in our series, as in 72 questionnaires, 84 per cent of the women stated that they were not anxious for more children, 8 per cent acknowledged the use of contraceptive measures and a few had practiced continence. Further there were three elective cesarean sections performed for indications, in part due to the fear of undoing successful repair work or the fear of dystocia due to these operations. In our final analysis of cervical operations and the bearing on secondary sterility all available facts must be taken into consideration.

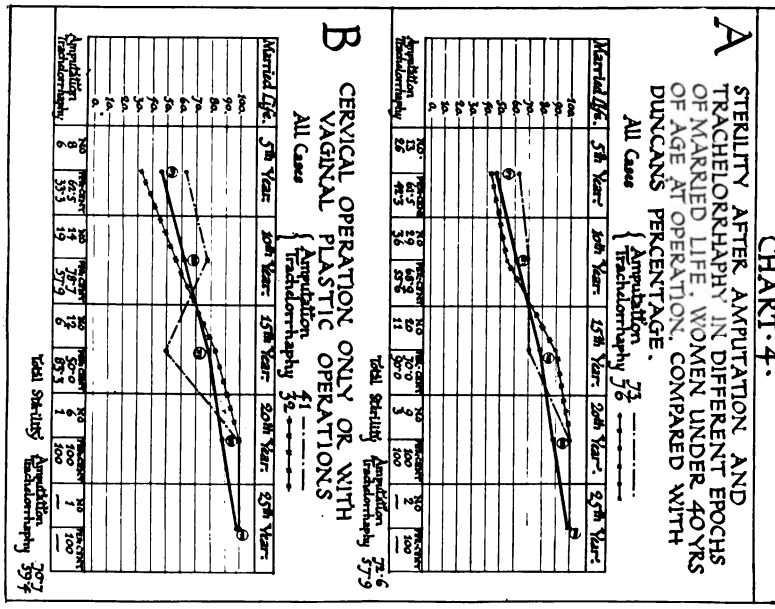
Among 149 women in the childbearing period (see Chart 3) under forty years of age at time of operation and menstruating regularly for at least one year after operation, there was sterility of 72.6 per cent for 73 cases of amputation compared to a sterility of 57.9 per cent for 76 cases of trachelorrhaphy or a greater sterility following amputation of 14.7 per cent. In Leonard's series of 101 similar cases there was sterility in 80.6 per cent of 72 amputations compared with sterility of 62.0 per cent of 29 trachelorrhaphies or a greater sterility for amputation of 18.6 per cent. As my series is made up of low, medium and high amputations and there is almost an equal number of cases of amputation and trachelorrhaphy, I believe 14.7 per cent more accurately represents the increase of sterility which follows amputation of the cervix. Therefore, in all cases, where cervical operations are used with other operations a little less than three-fourths of those subjected to amputation remain sterile whereas one and a half times more cases of trachelorrhaphy than amputation were subsequently fertile.

This increase of sterility after amputation in my series cannot be explained on the ground of the different age at marriage or the different number of years married. This is brought out in a classification of the cases which shows that the sterility for trachelorrhaphy when compared with amputation is even less or more nearly corresponds to the percentages established by Duncan. This is true for cervical operations alone or combined only with vaginal plastic operations as it is for the whole series of cases. This is graphically shown, for the different epochs of married life, in Chart 4.

Women in the childbearing period, classified according to different

Digitized by Google





groups of operations (Table II), show 11.3 per cent greater sterility for amputation; for the amputation and trachelorrhaphy combined with round ligament or uterosacral shortening or ventral suspension or a combination of these operations, it shows 15.2 per cent greater sterility in the cases of amputation; and in amputations and trachelorrhaphy combined with myomectomies, or resections of one or both ovaries, or

Digitized by Google

salpingooöphorectomy unilateral or a combination of these operations there was 18.2 per cent greater sterility for the cases of amputation. Therefore as there is a marked influence of the intraabdominal operations it seems reasonable to exclude these cases and to base our final analysis only on cases in which cervical operations alone or in combination with vaginal plastic work have been done. Thus the increase of sterility for cases of amputation compared to trachelorrhaphy is 11.3 per cent.

TABLE II

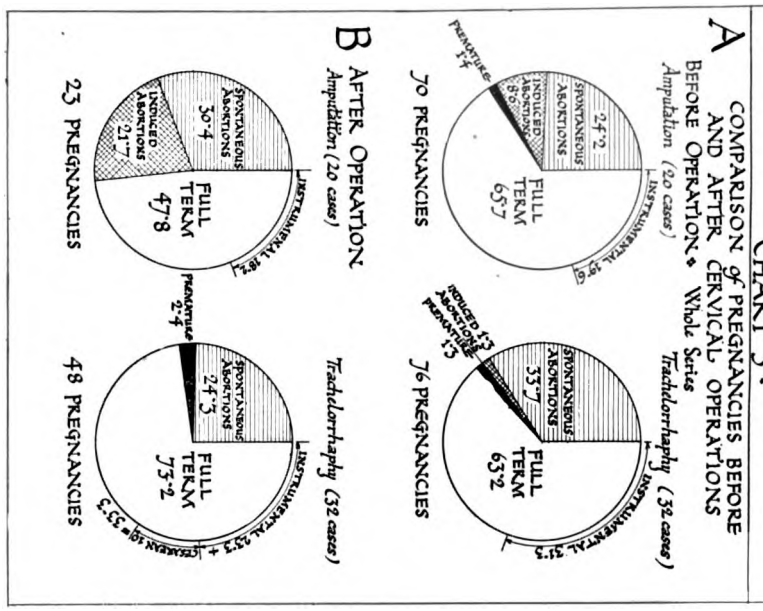
OPERATIONS ARRANGED IN GROUPS

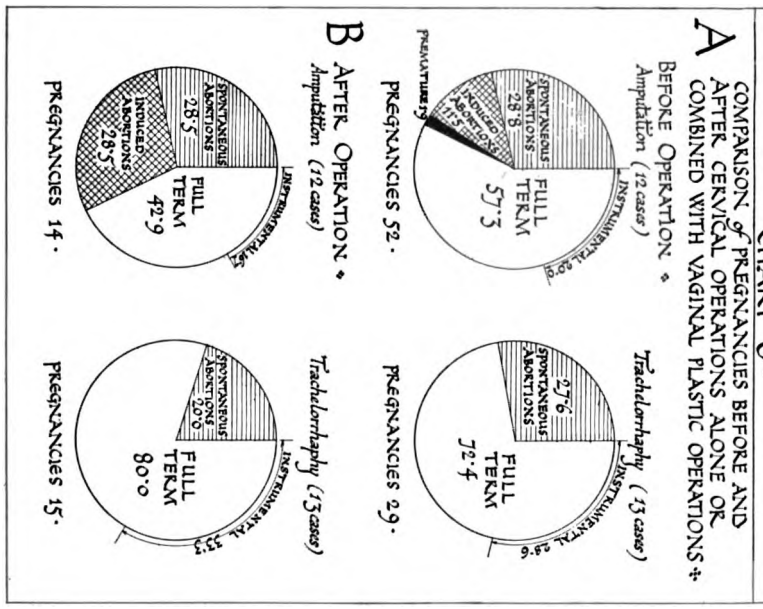
	NUMBER OF CASES	FERTILE AFTER OPERATION	STERILITY
A. Cervical Operations alone or with Vaginal Plastic Operations.			
Amputation	41	12	70.7%
Trachelorrhaphy	32	13	59.4%
B. Cervical Operations with Abdominal Operations for Uterine Displacement.			
Amputation	21	7	66.7%
Trachelorrhaphy	33	16	51.5%
C. Cervical Operations with Conservative Abdominal Operations.			
Amputation	11	1	90.9%
Trachelorrhaphy	11	3	72.7%
Totals—			
Amputation	73	20	72.6%
Trachelorrhaphy	76	32	57.9%

5. *Course of Pregnancies after Cervical Operations.*—To determine the cause of abortion, of premature labor, or of dystocia in women who give a history of former easy full-term labors is often a difficult task. Therefore to classify the character of the pregnancies and labors and to assign their cause to different operative procedures, of necessity in different series of women, makes the problem become even more difficult. However, if we compare pregnancies and labors before and after amputation of the cervix and before and after trachelorrhaphy, we are able in each group to establish the influence of operation on the subsequent pregnancies and labors. Then using these facts as a check in comparing the subsequent pregnancies and labors, of necessity in a different series of cases, should give fairly accurate facts as to the occurrence of abortion, premature labor and dystocia as a result of amputation of the cervix or of trachelorrhaphy.

(*a*) *Premature Labor and Abortion.*—Comparing pregnancies before and after amputation (Chart 5), we find, after amputation, 17.9 per cent fewer full-term labors, and 6.2 per cent more spontaneous abortions. Of the remaining pregnancies interrupted before term there were, after amputation, no premature labors as compared to 1.4 per cent before operation but there was an increase of two and a half times the number of induced abortions. Comparing the pregnancies before and after trachelorrhaphy we find a 10.0 per cent increase of full-term pregnancies and a decrease of 9.4 per cent in the

Digitized by Google





spontaneous abortions, but twice as many premature labors (1.3 compared to 2.4). Thus in like groups of cases amputation decreases and trachelorrhaphy increases the number of full-term labors while the opposite is true for spontaneous abortions. But premature labor which occurred in an equal percentage (1.3) before operation recurred only after trachelorrhaphy.

Digitized by Google

With these facts established let us contrast, of necessity in different series of cases, the pregnancies following amputation with those following trachelorrhaphy. There were 25.4 per cent fewer full-term labors, and 6.1 per cent more spontaneous abortions but no premature labors for amputation as compared with trachelorrhaphy which had 2.4 per cent premature labors.

To obtain more accurate statistics let us contrast, in the same way, cervical operations alone or combined with vaginal plastic operations (Chart 6). Comparing the pregnancies before and after amputation we find for the latter cases 14.4 per cent fewer full-term labors and about an equal number of spontaneous abortions. Of the remaining cases interrupted before term we find no premature labors after operation as compared to 1.9 per cent before operation but an increase after operation of over twice as many induced abortions. Comparing the pregnancies before and after trachelorrhaphy we find 7.6 per cent more full-term labors and a decrease of 7.6 per cent of spontaneous abortions. Thus in the same series and like groups of cases amputation decreases and trachelorrhaphy increases the number of full-term labors but while trachelorrhaphy decreases the number of spontaneous abortions amputation has but little effect one way or another, but it is followed by more cases of induced abortions.

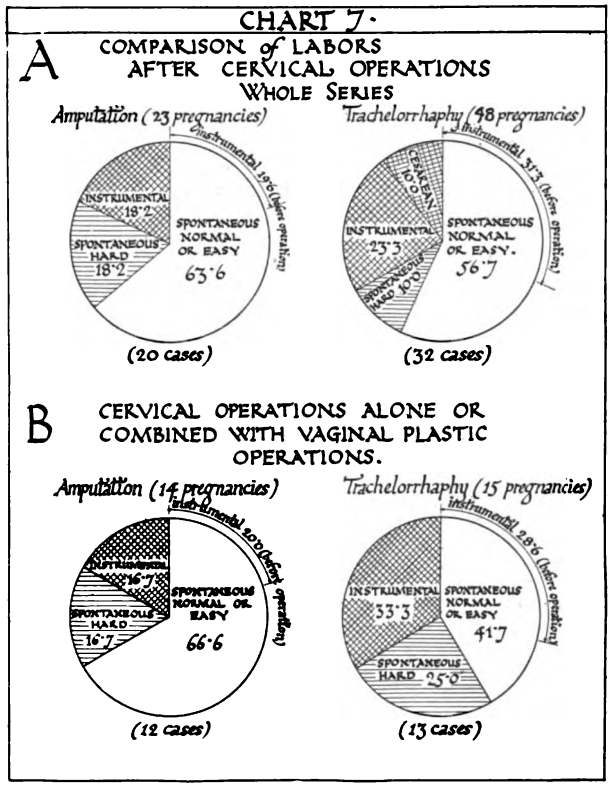
Now let us contrast the pregnancies following amputation with those following trachelorrhaphy. There were, for amputation, 37.1 per cent fewer full-term pregnancies and 8.5 per cent increase in the spontaneous abortions and 28.5 per cent of induced abortions with none following trachelorrhaphy. Finally, taking all facts under consideration, amputation of the cervix is more often than trachelorrhaphy followed by the interruption of labor before term, but is no more likely than trachelorrhaphy to be followed by premature labor. While the final analysis of cervical cases alone or with vaginal plastic operations showed for amputation practically no increase of spontaneous abortions yet trachelorrhaphy showed a slight reduction of spontaneous abortions. This confirms the well accepted fact of cervical laceration as a cause of abortion and the reason it does not apply to amputation is in proportion as high amputations occur in the series. While we lack definite records of our high amputations it is reasonably certain that of eleven full-term pregnancies but one followed high amputation and of five spontaneous abortions, with no contributing cause, two of them followed high amputation. This fact is substantiated by Leonard's series of high amputations, which showed the interruption of pregnancy before term in 64.0 per cent of which 45.0 per cent were abortions.

(*b*) *Dystocia.*—In labors before cervical operations our only available data of dystocia are the use of forceps. Comparing labors

Digitized by Google

before and after amputation, there is present about the same percentage of instrumental deliveries and the labors after trachelorrhaphy show a slightly higher percentage of instrumental deliveries than before operation. The three elective cesarean sections must be included in this end result as there was an apparent if not an actual dystocia—the "cervices showing no prospect of safe dilatation."

Comparing labors before and after cervical operations alone or combined with vaginal plastic operations we find after amputation a slight decrease of instrumental deliveries and after trachelorrhaphy



a slight increase of instrumental deliveries. Note that in this series there were no cesarean or other operative cases.

For spontaneous labors we have definite data for dystocia only as it occurred after operation. Thus for amputation we find a slightly higher percentage of labors classified as spontaneous, normal, or easy. However, after amputation, compared to trachelorrhaphy, there are about 8.0 per cent more cases classified as hard spontaneous labors but a little more than half as many operative deliveries.

Comparing subsequent spontaneous labors after cervical operations alone or combined with vaginal plastic operations, we find, after ampu-

Digitized by Google

tation as compared to trachelorrhaphy almost 25 per cent more spontaneous easy or normal labors with 8.3 per cent fewer cases classified as hard spontaneous labors and about half as many instrumental deliveries.

Therefore considering dystocia from the data at hand, it is more frequent after trachelorrhaphy than after amputation and I feel it is at its minimum for trachelorrhaphy, as some of the cases classified as spontaneous, normal, or easy deliveries would have shown dystocia but for a laceration of the cervix before full dilatation and for amputation this occurrence was less frequent.

(*c*) *Relaceration of the Cervix.*—Our statistics are incomplete as to relaceration of the cervix in labors following cervical operations. However, of cases of amputation examined after spontaneous labors 2 of 5 cases, or 40.0 per cent, showed relaceration and for trachelorrhaphy, under similar conditions, 6 of 12 cases, or 50 per cent, showed relaceration.

A review of the following abstracts of pregnancies and labors before and after amputation of the cervix and after trachelorrhaphy will, I believe, substantiate my analysis for dystocia.

CASE REPORTS ILLUSTRATING CASES OF LABOR BEFORE AND AFTER CERVICAL OPERATIONS

I. Amputation of the Cervix.

1. *Forceps Deliveries in Subsequent Labors.* (2 of 11 full-term deliveries or 18.2 per cent).

CASE 1.—Mrs. G., twenty-two years of age, married six years. Two full-term labors, first, instrumental in 1911. A 10 pound living child. Second, three years later delivered of a living baby by breech extraction. Unsuccessful perineorrhaphy after first delivery, fever following each delivery.

Amputation of cervix, repair of cystocele and pelvic floor. In the subsequent labor the first stage lasted 11 hours and 35 minutes, with moderate pains, regular, but infrequent. Second stage 2 hours and 44 minutes, pains, strong, regular, frequent but ineffectual. Third stage 6 minutes. Total duration of labor, 14 hours and 25 minutes. Position, L. O. A., at outlet O. A. Complication, prolapsed cord, narrow bi-ischial diameter.

After fourteen hours of labor the head deeply engaged and greatly moulded but there was no progress for two hours although there had been hard pains and the baby was passing some meconium. High median forceps applied and head extracted with great difficulty, median episiotomy on account of scar tissue in the perineum which was beginning to split. Male baby 9 pounds in weight.

NOTE: Dystocia was not due to the amputation of the cervix but to the large size of the child and to pelvic contraction as her previous labors were hard, first instrumental and second a breech, and there was a distinct narrowing of the bi-ischial spines.

CASE 2.—Mrs. N., 26 years, married 6 years, two children, no abortions or miscarriages. First labor, 1914, dry, spontaneous, 9½ hours, with male child, 7 pounds, 12½ ounces. Second labor, 1916, dry, spontaneous, 9 hours, male child, 8 pounds and

Digitized by Google

15 ounces. Operation, January 26, 1917, median amputation of cervix, repair of pelvic floor, Alexander's operation.

Subsequent dry labor with no real pains until the end of 14½ hours, when the cervix was fully dilated. Position L. O. P., converted and after pituitrin 1 c.c. and strychnine 1/20 by hypodermic, the pains became regular, frequent and effectual. Later, after an interval of three and a quarter hours there was no advance of the labor and low forceps were applied and a male child, 9 pounds and 14 ounces, was delivered. Total duration of labor, 18 hours and 3 minutes. First degree perineal tear.

NOTE: This labor was twice as long as either previous delivery due to the L. O. P. position, large baby and the lack of real labor pains but the cervix was not the cause of dystocia as it was fully dilated without effectual pains and without the aid of the bag of waters.

2. *Hard Deliveries in Subsequent Labors.* (2 of 11 full-term deliveries or 18.2 per cent)

CASE 1.—Mrs. McK., thirty-four years, admitted August 27, 1917. Married three years, never pregnant. Chief complaint, procidentia and cervical growth. Operation for cystocele, median amputation of cervix, transposition of uterosacral ligaments (Jellet's Operation) and repair of pelvic floor. Result partially satisfactory. Readmitted four months later because of retroversion of uterus and vaginal prolapse. Second operation for cystocele, Alexander's for retroversion and repair of pelvic floor.

Subsequent labor, 2½ years after last operation. Membranes ruptured spontaneously and labor lasted 10 hours and 40 minutes. In three hours and fifteen minutes from the beginning of labor, the cervix was dilated three fingers. Pituitrin M 10 at end of second stage and a female child, 7 pounds and 6 ounces, was delivered. Immediately following birth of head there was a sudden gush of blood, inspection revealed lacerations of anterior and right lateral walls of vagina; as well as around the urethra, posterior wall intact. The laceration of anterior wall about 3 inches in length. Lacerations sutured and vaginal pack placed.

Readmitted to hospital on September 21, 1920, and a vaginal hysterectomy, with over-lapping of broad ligaments and the fascia of anterior wall and a repair of pelvic floor was done.

NOTE: The unhappy sequelae in this case were not due to the amputation of the cervix but to the extensive and frequent operations and possibly to the injudicious use of pituitrin.

CASE 2.—Mrs. P., twenty-seven years, married 3 years, two spontaneous, hard labors, no abortions or miscarriages. Operation, 1918, amputation of cervix and repair of pelvic floor. Subsequently she had what she terms a hard full-term spontaneous delivery.

NOTE: Unfortunately this case was followed up only by a questionnaire, but as there is subjective evidence of the nature of her labors, it is reasonable to assume the hard labors before operation, and the hard labor subsequent to operation were due to the same cause and not to amputation of the cervix.

3. *Easy Deliveries in Subsequent Labors.* (7 of 11 full-term deliveries or 63.6 per cent)

There were seven full-term deliveries in which the subsequent labors were classified as normal or easy. In three of these cases there were previous operative deliveries. In one of these with two previous forceps operations of long duration, the subsequent delivery was spontaneous and two hours in duration. At the ninth month the cervix admitted one finger and at the onset of labor the cervix was three fingers dilated. Of the two others with previous single full-term deliveries, both instrumental, one

Digitized by Google

had a subsequent delivery at full term of nine hours' duration and the other an easy subsequent full-term delivery.

Of the four remaining cases with spontaneous labors before and after operation we have the following: In two there were premature labors at the seventh month and in one the subsequent labor was easy, of fifteen hours' duration and in the other there was a subsequent precipitate labor. In the remaining two cases, one with three previous spontaneous normal labors of an average duration of twenty-four hours each with a subsequent normal labor of twelve hours and the other with seven normal previous labors with a subsequent normal labor.

From a study of subsequent labors in cases of amputation of the cervix, we must question the statistics of others who claim a high percentage of subsequent dystocia and premature labors after this operation.

II. Trachelorrhaphy.

1. *Forceps Deliveries in Subsequent Labors.* (7 of 30 full-term deliveries or 23.3 per cent)

CASE 1.—Mrs. R., 24 years, one instrumental full-term stillbirth. Operation, divulsion and curettage, trachelorrhaphy, repair of pelvic floor, and appendectomy. Two years after operation, delivered at full term after manual dilatation of cervix and median forceps of a living baby boy weighing 7½ pounds. Presentation vertex R. O. A.

NOTE: Both the previous and subsequent deliveries were instrumental but the latter resulted in a live baby after the dystocia of cervix was overcome by dilatation.

In six cases, with instrumental deliveries in their subsequent pregnancies, all had had full-term pregnancies, before trachelorrhaphy, terminated by instruments. In four of these there were single previous full-term pregnancies which resulted in stillbirths although the subsequent pregnancies all resulted in live babies. Of these cases but three were re-examined and two showed a relaceration of the cervix. Of the remaining cases each with two previous pregnancies, one with an instrumental and spontaneous birth with subsequent instrumental delivery and the other with previous instrumental delivery and an abortion with subsequent instrumental delivery.

NOTE: In none of these was the duration of labor or the kind of operative delivery more severe than in previous deliveries and in a few, it was less severe. However, there was slight dystocia from the repaired cervix in over 42 per cent; in one manual dilation was done and in two there was relaceration of the cervix.

1. (*a*) *Elective Cesarean Section in Subsequent Labors.* (3 of full-term deliveries or 10 per cent)

CASE 1.—Mrs. D., twenty-six years, one full-term pregnancy, baby delivered by a forceps operation of long duration. Operation, divulsion and curettage, trachelorrhaphy, repair of pelvic floor, shortening of round ligaments and appendectomy. Two years later patient delivered, at term, by cesarean section because of extensive perineal and cervical repair following previous labor. The cervix showed no prospect of safe dilatation and there was a large unengaged head. Living male baby weighing 8 pounds and 11 ounces.

CASES 2 and 3.—These two sections were in successive pregnancies in the same patient. Mrs. A., thirty-four years, married ten years. Four full-term, normal deliveries. Operation, trachelorrhaphy, repair of pelvic floor, resection of left ovary and appendectomy. In the following three years patient was delivered twice, at term, by elective cesarean section for a large baby and a cervix which did not promise satisfactory dilatation and also to avoid possible extensive injury to the small parts.

Digitized by Google

NOTE: In all three of these cases there was an apparent dystocia due to the trachelorrhaphy.

2. *Hard Deliveries in Subsequent Labors.* (3 of 30 full-term labors or 10 per cent)

CASE 1.—Mrs. E., thirty-four years, married eighteen years. Four spontaneous full-term children and two abortions. Last child seven years ago and last abortion four years ago. Operation, divulsion and curettage, trachelorrhaphy and repair of pelvic floor. Subsequent labor was at full term and patient reported in her questionnaire that it was a "hard labor."

CASE 2.—Mrs. L., thirty years, married seven years. Four years ago a full-term 7 pound baby delivered by a spontaneous easy labor of two hours' duration. Operation, divulsion, curettage and trachelorrhaphy. Three years later or seven years after first pregnancy delivered of a 7½ pound baby by a long labor of twenty hours due to slow dilatation of cervix which was slightly lacerated.

CASE 3.—Mrs. C., twenty-two years, married four years, two full-term, normal spontaneous labors, last two years ago. Operation, curettage, trachelorrhaphy and removal of urethral caruncle. One subsequent full-term labor referred to by the patient as a "hard slow labor."

NOTE: Thus in the three cases in which previously only normal labors occurred there were subsequent hard labors. This was unquestionably due to a prolonged first stage due to slow dilatation of the cervix. In two a trachelorrhaphy alone was done and in the third a trachelorrhaphy and repair of pelvic floor.

3. *Easy Deliveries in Subsequent Labors.* (17 of 30 full-term deliveries or 56.7 per cent)

CASE 1.—Mrs. M., thirty-two years, married seven years. One full-term labor terminated by a hard instrumental delivery resulting in extensive cervical laceration and complete tear through the sphincter. During early months of her pregnancy the uterus was prolapsed. Subsequently patient had two abortions the last one followed by curettage. Operation, divulsion and curettage, repair of complete laceration of pelvic floor and trachelorrhaphy. Three years later delivered of male child weighing 7 pounds and 14½ ounces. Membranes ruptured spontaneously one hour before pains were established. Duration of labor two hours and thirty minutes. Hemorrhage, sixteen ounces in amount, immediately after third stage. Inspection revealed a right lateral laceration of the cervix extending up into broad ligament, which necessitated immediate suturing with three chromic gut sutures to control the hemorrhage.

CASES 2 AND 3.—Both of these subsequent normal labors occurred in the same patient. Mrs. C., twenty-six years, married three years. One full-term labor of forty-eight hours' duration, which was terminated by forceps. This was followed by four spontaneous abortions. Operation, trachelorrhaphy, repair of pelvic floor, shortening of round ligaments and appendectomy. In the following five years there were two full-term labors. The first was normal and spontaneous but was followed by relaceration of the cervix. The second was a breech extraction of a 6 pound 2 ounce female baby. Duration of labor, 8 hours and 13 minutes.

NOTE: Of the above three subsequent deliveries the easy and short duration can be accounted for in the first by the relaceration instead of dilatation of the cervix, and the same thing can be said for the first labor of the second case. As to the third case the cervical repair had given away in the previous labor. Therefore it seems to me that there was dystocia due to the trachelorrhaphy.

Five of the remaining cases with instrumental deliveries in previous labors had subsequent easy or normal deliveries as follows: (a) Previous operative delivery,

Digitized by Google

with stillbirth, and subsequent easy labor; (b) previous 27-hour instrumental delivery with subsequent 7- or 8-hour normal labor with relaceration of cervix; (c) previous instrumental delivery with a subsequent easy, normal labor; (d) previous instrumental delivery of 10 hours' duration and a premature, 8 months' baby, with a labor of 1 hour; subsequently a full-term spontaneous delivery of 2 hours' duration; (e) previous instrumental delivery of 24 hours' duration and a second pregnancy ending in an abortion with a subsequent premature delivery at the thirty-seventh week of gestation. Nine of the remainder of the seventeen cases had previous and subsequent normal or easy deliveries but one of these cases should be excluded as there had been a failure of the trachelorrhaphy due to secondary hemorrhage and secondary union.

NOTE: Of the 17 subsequent labors, one a premature following trachelorrhaphy, there is definite information in regard to relaceration in but 7, or 41.1 per cent. However, from this I am inclined to believe that the dystocia may not be apparent but that if all trachelorrhaphy cases were examined after subsequent easy labors, laceration would be more often found.

CONCLUSIONS

1. Amputation of the cervix and trachelorrhaphy are effectual and adequate operations and have a definite place in the gynecology of today.

2. Secondary hemorrhage and secondary union occur more often after trachelorrhaphy and are due rather to faulty technic than infection.

3. Improvement in the general health occurs in over 82 per cent of the cases for each operation but it is greater after amputation of the cervix.

4. Amputation of the cervix is more efficient than trachelorrhaphy in the cure of leucorrhea and dysmenorrhea but is more often the cause of these symptoms in cases previously free of vaginal discharge and menstrual pain.

5. Voluntary sterility is increased by cervical and vaginal plastic operations, but, all things being equal, there is 11 per cent greater sterility after amputation of the cervix than after trachelorrhaphy.

6. Amputation of the cervix is more often than trachelorrhaphy followed by interruption of labor before full term but is no more liable to end in premature labor than trachelorrhaphy. Abortion is more frequent after amputation in proportion to the number of high amputations.

7. Dystocia is greater after trachelorrhaphy both as to the number of operative deliveries and of difficult spontaneous labors.

8. With proper indications and technic, low, or medium amputation is as applicable as trachelorrhaphy to women in the childbearing age.

REFERENCES

(1) Emmet, T. A.: Am. Jour. Obst., February, 1869; ibid., November, 1874; ibid, November, 1897. (2) Hirst, B. C.: Atlas of Operative Gynecology, p. 85. (3) Crossen, H. S.: Operative Gynecology, 1920, ed. 2, p. 251. (4) Eden and Lockyer: New York, ed. 2, p. 819. (5) Anspach, B. H.: Gynecology, 1920. (6) Graves, W.

Digitized by Google

P.: Gynecology, 1920, ed. 2, p. 599. (7) Sturmdorf, A.: Gynoplastic Technology, 1919, pp. 28-31. (8) Leonard, V. N.: Surg., Gynec. and Obst., 1913, xvi, 390; 1914, xviii, 35. (9) Goodell and Emmet: See Leonard: Surg., Gynec. and Obst., 1914, xvii, 35. (10) Duncan, Matthew: Sterility in Women, London, 1919.

DISCUSSION ON THE PAPERS OF DRS. HENRY T. BYFORD, ROBERT L. DICKINSON AND REGINALD M. RAWLS

DR. ARTHUR H. CURTIS, CHICAGO.—I am impressed with the fact that we are still rather inclined to operate and to treat cervices entirely too much. I can see no reason why we should treat the cervix unless there be some very definite indications. What are those indications? First, there is cancer or impending cancer of the uterus. I say impending cancer with the understanding that you will all appreciate what that means, without further discussion. Second, sterility. Until we know more about other conditions which cause sterility, such, for instance, as patency of the tubes, gonorrheal infection in the husband, and other factors, I believe we should not under any circumstances attempt any reparative or plastic work upon the cervix for the relief of this condition. It is my belief that if sterility is due to disease of the cervix, it is ordinarily an instance in which we have a very marked infection with leucorrheal discharge. So finally we come to another possible indication for the treatment of the cervix, and that is the leucorrheal discharge, either because it is an infectious process or because the leucorrheal discharge annoys the patient and requires treatment. Further, I believe focal infection of the cervix is an important indication for treatment, but focal infection of the cervix hardly ever occurs unless there is also a leucorrheal discharge.

What is the pathology of cervical disease? There are two important types. First, there is that type of pathology associated with pregnancy. As a result of bearing children, there is edema, eversion, laceration, and torn cervical lips, oftentimes associated with the formation of cysts, and sometimes with discharge. Second, there is disease of the cervix which occurs in women who have not had children and which is usually of gonorrheal origin. If we have a disease of the first type which I mentioned, that is, tearing with eversion, erosion and other lesions which occur after childbirth, I am impressed that the methods which have been recommended by Dr. Byford, and which Dr. Dickinson has described so nicely, will cure the great majority of patients. Amputation of the anterior lip after separating the bladder, as we do in the advancement operation, will oftentimes remove the focus of infection. On the other hand, if there is extensive gonorrheal disease or other serious infection which extends upward as far as the internal os, I am inclined to think these procedures do not reach high enough to eradicate the trouble in such cases. Even the Sturmdorf operation, although it oftentimes will relieve the infection if it is in the lower portion of the cervix, is not radical enough to remove the entire focus. We must then have recourse to measures which will get rid of the deep-seated trouble. I believe here we have a field for radium treatment. Small doses of radium put into the cervix up to or beyond the level of the internal os will destroy the excessive glandular growth. If we keep the cervix dilated so that it does not stricture, radium applied in small doses at intervals of not more frequently than once in three months, will relieve these patients.

I think the most important principles in the treatment of infected cervices consist in the destruction of Skene's ducts and dilatation of the cervix, and use of a small dosage of radium not more frequently than once in three months. We use two twenty-five milligram tubes in tandem, applied for not more than six or eight hours, with a screen of one half millimeter of gold. The treatment ought not to be repeated short of three months. Subsequent treatment will depend on whether menstruation has been shortened as a result of the use of radium.

Digitized by Google

DR. HENRY P. NEWMAN, SAN DIEGO, CALIFORNIA.—There are so few normal cervices in the nonparous, as well as parous woman of today, that this subject is naturally of great importance to the gynecologist. Fortunately correction and relief of these defects have not been limited to the two definite and circumscribed operations cited by the essayist. Amputation of the cervix and trachelorrhaphy are, in my opinion, operations of the developmental epoch of gynecology and have few or only exceptional indications in present day surgery. Tracheloplasty, an operative technic for which I discarded all former methods and which I offered to the profession some two or more decades ago in various publications* is, as its name implies, the surgical repair of defects of the neck of the uterus,—in other words the removal of the pathology and the plastic reconstruction of the organ. By this method, both contour and function are conserved. When properly understood its simplicity of procedure and general adaptability leave little to be desired in corrective and restorative surgery of the cervix.

DR. THOMAS J. WATKINS, CHICAGO.—I am enthusiastic about the use of radium in these cases when properly administered because it cures the erosion.

DR. HENRY T. BYFORD, (closing the discussion on his part).—In my paper I merely spoke of one phase of cervical endometritis. Last year I read a complementary paper on inflammation higher up in the cervix, about the internal os. My chief reason for giving treatment is the remote danger of carcinoma, and I do not feel satisfied in merely telling the patient to come back for examination occasionally, so that I can watch her case. If she is coming back occasionally for inspection, I may as well cure her in the first place and remove the risk. I think Dr. Dickinson's delicate way of cauterizing the tissues is intended by him for so-called erosions that are more superficial, but it is necessary in these cases to penetrate the tissues more deeply.

DR. ROBERT L. DICKINSON, (closing the discussion on his part.—I wish to draw attention to the extraordinarily small number of true carcinomatous conditions found on section of these amputated cervices. I wondered whether Dr. Curtis in making the sweeping statement he did concerning the cystic cervix meant that it should be let alone. I was not talking of little cysts; I showed pictures of deep-seated cysts. I do not think Dr. Curtis meant that we should disregard granular raw areas that have been giving symptoms for many years in which cancer can and may develop, and I think it ought not to go out from this Society that such conditions can be disregarded.

As to the use of radium, I have seen two penalties with the use of radium due possibly to unskillful treatment, and either an overdose or a repeated dose produced a senile cervix with scar tissue, secreting an acrid material that continued to chafe the vulva. I cannot cure one such patient. The same thing occurs in the intractible menorrhagias where an overdose of radium has done damage to the uterus, producing an exceedingly irritating secretion. Radium, therefore, must be used with expert care, perhaps in nonrepeated treatments.

DR. REGINALD M. RAWLS, (closing the discussion).—In regard to Leonard's statistics, if we make a careful study of his report we will find his results have been based on 400 cases operated on in Dr. Kelly's clinic, and that he followed up by letter the great majority of them. Furthermore, he states distinctly that all his amputations were high amputations of the cervix; that is, a cuff was made and two and a half centimeters of the cervical tissue was removed. In the series of cases I studied it was impossible for me to get the number of low, medium, and so-called

*Newman, Henry P.: The Indications for Plastic Surgery upon the Cervix Uteri, Tracheloplasty, with a New Method of Operating. Jour. Am. Med. Assn., Sept. 10, 1898, xxxi.
Newman, Henry P.: Tracheloplasty. Jour. Am. Med. Assn., April 20, 1901, xxxvi.

Digitized by Google

high amputations which some of the operators referred to in their histories of cases of cervical disease. We are dealing with a series of cases in which some of the amputations were high, some medium, and some low.

Furthermore, as to the more frequent occurrence of abortion following amputation, it would occur more frequently in those cases in which high amputation was done.

In regard to dystocia, I shall publish in the paper several cases in which operative procedures were followed by pregnancies. The outstanding points in the study of these cases are: In amputation of the cervix the first stage of labor is shorter than after trachelorrhaphy. Patients who have had amputation of the cervix, those who answered by letter, have reported their labors were easier where we know for comparison, the total number of hours of labor previous to amputation, and although these women have had one or two children, they may have had labor extending over twelve or twenty-four or forty-eight hours in the previous pregnancies. Their labors have been much easier following this procedure. The labor has lasted four or five hours in some as compared with twelve or twenty-four hours before this operation was done. In all cases where there is a report obtainable, any re-laceration in subsequent pregnancies that may have occurred took place after trachelorraphy and not after amputation.

Digitized by Google

ABDOMINAL ABORTION

By Franklin S. Newell, M.D.
Boston, Mass.

(Read by Title)

BY THE term abdominal abortion is meant the termination of pregnancy by abdominal hysterotomy, in preference to a pelvic operation, before the period of viability has been reached. This operation is in my opinion indicated in patients to whom the continuance of pregnancy offers a serious menace to life and certain injury to health owing to the presence of some chronic disease.

The principal advantages of this operation are due to two factors. First, that it can be performed under local anesthesia on patients who are considered bad risks for the administration of a general anesthetic. And, second, that since the contraindication to pregnancy is a permanent one the termination of the pregnancy can be accompanied by sterilization of the patient. The present pregnancy can be ended and future pregnancies made impossible at a single operation with a minimum of risk. Although in this paper I shall go more fully into the technic under local anesthesia, I wish to state that I prefer to operate under a general anesthetic if the patient's condition warrants it, and that I do not advocate abdominal abortion in patients who can safely be given a general anesthetic unless sterilization to guard against future pregnancy seems desirable.

It is well recognized by the majority of the medical profession that the occurrence of pregnancy in women who have severe chronic disease is often attended with such danger to life and health as to render the induction of abortion a justifiable procedure, and it has been the custom of the medical profession to advise and perform such abortions after due consultation. Further, if the indication is a permanent one, it is customary to advise the patient that under no circumstances should pregnancy occur again, for the reason that the only alternative under such circumstances to prevent the patient's going through pregnancy, at the expense of her health at least, is repeated abortion, and repeated abortions on the same patient are properly considered unjustifiable.

My experience has been, however, particularly in the lower classes in the community, that although future pregnancies may be absolutely forbidden, the patient often fails to follow the advice given either because of ignorance of the preventive methods to be adopted, or because of the failure of the methods advised, and the medical adviser is then confronted with the unpleasant alternative mentioned.

Digitized by Google

A certain proportion of the medical profession believes that it is not the function of the medical adviser to provide ways and means to prevent pregnancy and that the patient should be advised that pregnancy is dangerous and unjustifiable, and left to her own resources to prevent it. Such an attitude on the part of the profession seems to me nothing more than an attempt to evade responsibility which properly belongs to the medical profession. I believe that when a patient is advised that under no circumstances should pregnancy occur, the advice as how to avoid pregnancy should be given. I further believe that when it is recognized that a permanent condition exists which renders pregnancy so dangerous to the life or health of the patient as to warrant the performance of a therapeutic abortion, sterilization of the patient to render future pregnancies impossible is a justifiable procedure. I feel that unwillingness to adopt this course is a failure on the part of the medical profession to recognize and accept the proper responsibility entailed by the advice given. My experience has shown that no matter how careful advice may be given in certain cases, pregnancy does sometimes occur, and I believe it is preferable to make pregnancy impossible rather than to be content with forbidding it.

If the medical adviser feels that under no circumstances should future pregnancy be allowed and is willing to accept the responsibility of making it impossible, he has a double choice of procedure open to him. He may either terminate the pregnancy by one of the ordinary methods and at a subsequent time sterilize the patient by an abdominal operation, or have her treated with radium or the x-ray and sterility induced by the destruction of the ovaries thus producing an artificial menopause, or he may terminate the pregnancy and sterilize the patient at the same time by abdominal hysterotomy followed by the amputation of the uterus or excision of the tubes from the uterine cornua. My own preference is to accomplish the abortion and sterilization at a single operation rather than to subject the patient to two operations to accomplish the desired result.

The ordinary indications for which abdominal abortion may be indicated are first, serious cardiac lesions which have at some previous time whether during pregnancy or not resulted in decompensation, particularly in patients who are showing signs of failing compensation early in the present pregnancy, and second, cases of chronic nephritis where the disease is distinctly progressive and where the previous history shows that recent attempts at childbearing have resulted in the birth of stillborn children in spite of adequate medical attention. These two classes of cases seem to me to offer absolute contraindications to pregnancy and there is practically no chance of sufficient improvement taking place under any method of treatment to

Digitized by Google

give any hope that pregnancy may be undertaken at some future time with any chance of a successful termination.

There are certain other indications which may warrant the operation in rare cases. For instance, quiescent though not arrested pulmonary tuberculosis in patients who already have children would seem to me a proper indication both for the termination of the present pregnancy and for sterilization after due consultation with the patient. In such cases the danger to maternal life is very great, and the life of the patient should be preserved for her children if possible. Occasional cases of diabetes which do not yield to ordinary treatment may also offer indications for sterilization in addition to the termination of the pregnancy.

The operation finds its greatest usefulness, however, in patients with decompensated cardiac lesions in whom attempts to restore compensation have failed. In these cases the use of a general anesthetic may be possible, but in most cases I believe operation can be more safely performed under local anesthesia. I recognize that a general anesthetic may be given with relative safety to a certain proportion of these patients if given by a skilled anesthetist, but I believe that there is a small group of patients to whom the use of any general anesthetic is extremely dangerous, and therefore believe that the performance of an operation under local anesthesia is a distinct advance. I personally prefer to use a general anesthetic in all cases where the risk to the patient does not seem too great owing to the increased freedom of choice of operation which it permits, but do not believe that any general anesthetic, no matter how carefully it is given, is safe in certain cases of cardiac decompensation.

When it is considered unwise to use a general anesthetic, our choice is spinal anesthesia, paravertebral anesthesia, or local anesthesia. I have not had sufficient experience with spinal anesthesia in cardiac decompensation to speak with authority, but I should hesitate to employ spinal anesthesia on a patient with decompensated heart on account of the sudden changes of blood pressure which accompany this method. The administration of paravertebral anesthesia is familiar to but few men in this country, and it is a long and exhausting process for the patient, and after a limited trial of this method I have become convinced that it is not a satisfactory method of anesthesia in patients with cardiac decompensation. I have therefore adopted local anesthesia preferably preceded by the administration of morphine and scopolamine in cesarean section at full term in cases in which the use of a general anesthetic has been advised against by a competent medical consultant, and, with the exception that in the occasional case first intention healing of the abdominal wound has been interfered with by too free an infiltration of the abdominal wall with

Digitized by Google

novocaine in a patient whose general resistance has been below par, I have been perfectly satisfied with the results.

I believe it is a great advantage to the patient and also to the operator that the patient should not be fully conscious during an operation under local anesthesia. I think that it militates markedly against the success of the anesthetic to have a patient hear what is going on in the operating room and I believe it is especially important for the operator not to keep asking the patient if the operation is painful. Many patients are exceedingly nervous about operation under local anesthesia, and if the operator keeps asking the patient whether his manipulations are painful, sooner or later the patient will decide that she feels pain and begins to complain, whereas if the patient is asleep at the beginning of the operation and the technic is carefully carried out, there will be no complaint of pain during the operation and next day the patient will have no memory of any discomfort.

This use of the twilight sleep sequence followed by local anesthesia, having proved successful in cesarean section at term, has been tried in several instances on patients relatively early in pregnancy, the earliest case in my series being between ten and eleven weeks according to the dates as well as to the physical findings. I feel that these early cases offer the most severe test as to the efficiency of this method of anesthesia because the tension on the pelvic peritoneum which must be employed to bring the uterus to the abdominal wound is perhaps the one manipulation most likely to cause pain and is therefore the most severe test of the efficiency of the anesthetic. If the operation can be done successfully in the early weeks of pregnancy in spite of this handicap, it can be done at any subsequent period with increasing ease as the uterus becomes larger and larger.

It has been my experience in the occasional case, especially in exceedingly nervous women, that the morphine-scopolamine fails to have the desired effect in producing quiet sleep and the patient may become rather excited as has been constantly reported in the use of twilight sleep in normal labor. This condition renders operation under local anesthesia practically impossible, and in one case in my series a patient with a badly decompensated heart insisted on remaining in a sitting position and could not be persuaded to lie down. Ether had to be employed on this patient although she was considered a bad risk for general anesthesia. The eventual result was satisfactory although the anesthetist reported the patient as being pulseless throughout the operation, and the ease and comfort of the operation from my standpoint were distinctly interfered with although the patient eventually did well.

When the abdominal abortion is performed under a general anesthesia it requires no particular description. The ordinary steps of the abdominal cesarean section are followed in miniature and the patient

Digitized by Google

is then sterilized either by supravaginal hysterectomy or by the excision of the tubes from the uterine cornua. I find that the preservation of the menstrual function means a good deal to comparatively young women, and in these cases I believe it wise to sterilize by excision of the tubes rather than by hysterectomy although the uterus is a useless organ.

The technic of the operation under local anesthesia warrants detailed description because I feel that the success of the operation depends on proper attention to details, and I have seen some lamentable exhibitions in cases in which the proper technic was not followed.

In the first place the patient should be brought under the influence of the morphine-scopolamine in a quiet room near the operating room and in the majority of cases she can be brought to operation sleeping peacefully and usually will not rouse fully during the operation if care is taken to avoid rough handling and unnecessary noise. The technic which I employ, which was first suggested to me by Dr. F. C. Irving, is as follows:

About two and one-half hours before the time set for operation the patient is given 1/6 of a grain of morphine and 1/200 of a grain of scopolamine by hypodermic injection. The scopolamine is repeated at 40-minute intervals, but it is not usually necessary to repeat the morphine. Three or four doses of scopolamine, but occasionally more, are necessary to produce quiet sleep. The patient's eyes are covered, the ears plugged, and she is brought to the operating room as quietly as possible, and care is taken not to allow any unnecessary noise or conversation in the operating room.

The field of operation is prepared quickly with iodine and the site of the incision is anesthetized by 1/2 per cent novocaine, care being taken to anesthetize the skin thoroughly and also the fascia layer. I believe it is unnecessary to especially anesthetize the parietal peritoneum, for in my experience the peritoneum is either much less sensitive than has been alleged or is sufficiently anesthetized by the injection of the fascia to render manipulations painless. As soon as the abdominal wall has been carefully injected the operator must then make up his mind to wait the proper length of time before beginning the operation. This is very essential as the novocaine is a slow acting drug and does not produce anesthesia until after a definite interval has elapsed. If the patient is sound asleep at the time of the injection of the abdominal wall, five minutes is all the delay necessary for the novocaine to take effect before beginning the operation. If the patient is restless and moves about on the table, an interval of at least ten minutes should be allowed.

After the proper interval the abdomen is opened in the usual way, a low median incision being made just above the symphysis. If the pregnancy is of more than three and one-half month's duration, the uterus can easily be manipulated through such an incision without marked traction on the peritoneum. In earlier cases the uterus must be grasped with hooks and drawn up to the wound, at times considerable traction being necessary. This may cause some reaction on the part of the patient, but as a rule no great amount. The uterus itself is practically non-sensitive and can be opened at will, the ovum removed with the finger and the wound sutured without any marked reaction on the patient although some patients will move more or less and groan occasionally.

If sterilization is to be done under local anesthesia the most satisfactory method is excision of the tubes from the cornua of the uterus. In my experience the injection of a syringe full of novocaine into the inner portion of the broad ligament

Digitized by Google

and the cornua of the uterus is advisable before sterilization is performed. The presence of old abdominal adhesions increases the difficulty of the operation to some extent since peritoneal adhesions are extremely sensitive, but they can be injected with novocaine and cut and tied if a proper interval is allowed for the action of the novocaine. I believe the manipulations necessary to remove the uterus under local anesthesia would probably cause too much pain owing to the traction on the peritoneum which would be necessary, and have not attempted this method of sterilization under local anesthesia. The uterine incision and the abdominal wall are closed as in any ordinary cesarean section and the patient is then treated as any other laparotomy.

It has been my experience on questioning the patient the day after operation as to the amount of pain suffered during the operative procedure to learn that even in the cases where the patient apparently felt a good deal while the operation was going on as evidenced by restlessness and groaning, there was absolutely no memory of any discomfort during operation. Surgical shock has been largely absent in my cases. Postoperative vomiting has not occurred with this method of anesthesia, at least not in my limited experience.

I feel strongly that this method of operation is a distinct advance for patients who present permanent contraindications to pregnancy and in whom sterilization is considered justifiable. There is less shock and less loss of blood than in abortion by the pelvic route, and in addition the patient is protected from recurrence of pregnancy.

I do not wish to be understood as advocating abdominal abortion under local anesthesia in patients who are good risks for the use of a general anesthetic, but I have seen a patient with a decompensated heart lesion die on the table during the preliminary stage of anesthesia when ether was being given by a competent anesthetist and believe that such disasters may be prevented by the use of local anesthesia preceded by the morphine-scopolamine sequence.

In addition I would say that I should not advocate this method of operation, that is abdominal abortion and sterilization, for any patient unless careful study of the case showed a definite contraindication to future pregnancies which was of a permanent nature. I believe it to be an operation for the unfit patient whose life is threatened by a continuation of pregnancy and to whom future pregnancies are equally dangerous.

Digitized by Google

IN MEMORIAM

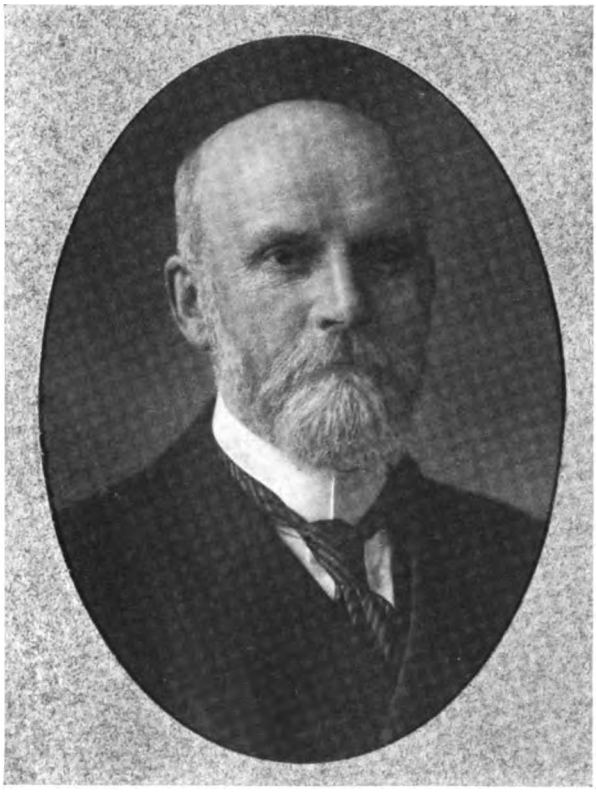
DAVID BERRY HART, M.D., F.R.C.P. EDINBURGH

By Robert L. Dickinson, M.D.
New York

FROM the fields of teaching and stirring debate and original research in our twin specialty the death of Berry Hart removes a figure prominent for forty years. To the Seniors in this Society the writings of our Honorary Fellow meant very much. To the Juniors his example will furnish keen stimulus. He set up landmarks and boundaries. He bred teachers and thinkers. His work was done at a time that was critical. Hart-and-Barbour was a name to conjure with, and that textbook rightly bulked large. It was not merely that it drew from varied sources with the catholic learning that knows no nationality; it was not alone that it was well-balanced and adequate and complete, or that it was equipped with illustrations singularly direct and simple as teaching stuff; it was based, beyond most books, on solid anatomical and microscopical studies—it was a pioneer. Published in the early eighties, it made what was the most important contribution, for the English speaking world, looking toward the establishment of gynecology as "a true, self-contained, scientifically founded specialty." Thus to Edinburgh for many years did America look for the training of some of its ablest teachers. May that relation continue!

David Berry Hart, M.D., F.R.C.P., Edin., was born October 12, 1851, and died June 10, 1920, in his sixty-ninth year. He received his M.B. at the University of Edinburgh at twenty-six, then studied in Vienna, and returned to the University as private assistant with Professor Alexander R. Simpson. At twenty-nine he presented for the degree of M. D., his thesis on structural anatomy based on frozen sections, and won the gold medal and the Syme surgical fellowship. He collaborated with Professor Simpson on the plate on the genu-pectoral posture, and issued the Atlas on the Structural Anatomy of the Female Pelvic Floor. At thirty-three he was made Assistant Physician to the Royal Maternity Hospital and two years later Assistant Gynecologist to the Royal Infirmary, moving on to the Senior positions at thirty-eight and forty, respectively. In the early nineties he served as gynecologist to Leith Hospital. At thirty-two Hart began systematic teaching in the School of Medicine of the Royal Colleges and continued

Digitized by Google



D. Berry Hart

CAT

Digitized by Google

Digitized by Google

to give courses on midwifery here until within a few weeks of his end. Here he collected a large and important museum of specimens and gave to their preservation and investigations very many hours and years of a full life. He was fertile indeed, publishing, between his thirtieth and thirty-second year, no less than twelve papers, and he wrote not only a "Guide to Midwifery" but observations on "Evolution and Heredity." Other activities were as Librarian of the Royal College of Physicians and as Examiner in Midwifery in the Universities of Edinburgh, Oxford, Birmingham and Liverpool. He was an Honorary Fellow of the Berlin Obstetrical Society, and Corresponding Fellow of the Leipzig Obstetrical Society, as well as one of our Honorary Fellows. In 1890 he was President of the Edinburgh Obstetrical Society. His College gave him the Victoria Jubilee Cullen Prize for the greatest benefit in practical medicine of the preceding four years.

To recall to memory a visit to Berry Hart is to summon back the series of surprises at his varied interests. This incessant scientific investigator at one time did a large general practice; this laboratory dweller lived in a beautiful home with a stately outlook; this strong man in debate was a kindly wit and courteous friend; this omniverous reader and student had done the first operations in Scotland for ruptured tubal pregnancy and advanced broad ligament gestation; and this mind, stored with learning, made even the medical student try to work out his own conclusions. He made men think. He roused men's scientific spirit. And one loves most to think of him in the museum, among the treasures that had made obstetric and gynecological history lighting us with the fire of the contagion of his enthusiasm.

Digitized by Google

IN MEMORIAM

BENJAMIN ROBINSON SCHENCK, A.B., M.D., F.A.C.S.

By W. P. Manton, M.D.
Detroit, Mich.

FOLLOWING a long and trying illness, Benjamin Robinson Schenck, a Fellow of this Society, died at Colorado Springs, June 30, 1920. Dr. Schenck was born in Syracuse, N. Y., August 19. 1872, and was of Dutch descent, his ancestor, Rulef Schenck, having settled in this country in 1650.

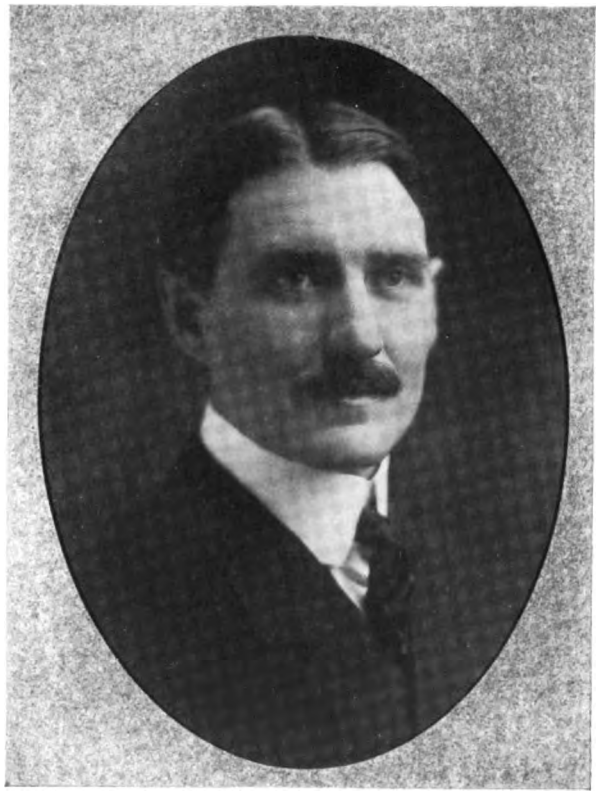
Young Schenck may have inherited his love for medicine from his paternal grandfather, who was graduated from the Geneva Medical College in 1835, but after some years of practice, turned to homeopathy, in which he found satisfaction, and was also, still later, ordained a minister of the gospel, thus evincing both versatility and broad-mindedness.

Following his preparatory course, Dr. Schenck entered Williams College, graduating A.B. in 1894, and then took up the study of medicine at Johns Hopkins Medical School, Baltimore, Md., receiving the degree of M.D. in 1898. The following five years were spent at that Hospital under Dr. Howard A. Kelly on the gynecological and teaching staff, during a portion of which time he was Resident Gynecologist (1902-3). In 1903 Dr. Schenck took up his residence in Detroit, Michigan, and, because of sterling worth and fine ability, was not long in establishing a position in the community.

On August 17, 1904, he was married to Miss Jessie McCallum of St. Catherines, Ontario, by whom he had two children.

Dr. Schenck impressed all with whom he came in contact as a man not only skillful and well qualified in the specialty to which he was devoted, but as possessing an unusually high and spiritual quality which made for sweetness and loveliness of character not often met with. Starting out on his professional career in a strange city where he had few acquaintances, this indefinable attribute soon won for him a host of friends who remained staunch and steadfast,—and led to the acquiring of an enviable position in the profession in which he became a recognized leader both in city and state. While aggressively building a practice, he was ever generous and thoughtful in his atti-

Digitized by Google



Benjamin R. Schenck

Digitized by Google

Digitized by Google

tude toward his associates, giving and demanding honest treatment in all things. Indeed this characteristic of thoughtfulness for others followed him throughout life, and was an asset which endeared him to both patient and fellow practitioner. While his life was crowned with well-earned and deserved success in private work, Schenck will be remembered by the spirit of service which entered into all that he did.

Having literary tastes and believing in the advantages which accrue from the study of the writings of leaders in the profession, both old and modern,—in some measure possible due to associations with Osler while at Hopkins—he became much interested in the building up of the library of the local County Medical Society—which now ranks among the best of such collections—and the enthusiasm with which he undertook this work and the excellent success which followed his efforts, will long remain a monument to his wisdom and judgment.

His work in the Michigan State Medical Society, of which he was Secretary and editor of transactions from 1906 to 1908, resulted in renewed activity and accomplishment of that body. As a teacher he was concise, thorough and convincing, and his evident familiarity with his subject impressed the student and gave him popularity with his classes.

Dr. Schenck was a member of a number of social organizations, where his presence was always welcome because of his amiability and quiet wit; and he was also active in city, state and national medical societies. At the time of his death he was Associate Professor of Gynecology in the Detroit College of Medicine and Surgery; Gynecologist to Harper Hospital, and Consulting Obstetrician to the Womans Hospital and Infants Home.

Memory is the corm of life, its roots reaching back into the past nourish the present and render bright with hope the future. By memory, those who have entered the valley come back to us, not as disembodied spirits, but uplifting and inspiring through their deeds and accomplishments erected during life. Thus we remember Schenck; gentle and kindly, forceful when occasion demanded, never trespassing on the rights of others; a true friend, wise counselor, God-fearing man; and thus passed a life worthy of emulation; not full of years as counted by the calendar, but ripe with friendships, rounded with achievements, and well-done to the end.

"Into the Winter's grey delight,
Into the Summer's golden dream,
Holy and high and impartial,
Death, the mother of life,
Mingles all men forever."

Digitized by Google

A Partial List of Dr. Schenck's Contributions to Medical Literature

(1) Refractory Subcutaneous Abscesses Caused by a Fungus, Possibly Related to Sporotrica, 1898.

(2) Four Cases of Calculi Impacted in the Ureter.

(3) Vaginal Ureto-lithotomy, Jour. Am. Med. Assn., 1901.

(4) Fifty-eight Cases of Post-operative Crural Thrombosis, 1902.

(5) Relaxation of the Synchrondrosis of the Symphysis Pubis following Labor, Treated by Suturing, Jour. Am. Med. Assn., 1902.

(6) Symptoms, Diagnosis and Treatment of Ureteral Calculi, Johns Hopkins Reports, 1902.

(7) Twenty-eight Pound Ovarian Cyst in a Woman Seventy-seven Years Old, Jour. Am. Med. Assn., 1903.

(8) Phloridzin Test for Renal Insufficiency, Jour. Mich. Med. Soc., 1904.

(9) Renal Hematuria of Unexplained Origin, Jour. Mich. State Med. Soc., 1904.

(10) Concerning So-called Essential Hematuria, with Especial Reference to the Hematuria Accompanying Mild Grades of Nephritis, Inaugural Thesis, Am. Gynec. Soc. Tr., 1911.

Digitized by Google

Digitized by Google

CAT.

B. J. Baer

Digitized by Google

IN MEMORIAM

BENJAMIN FRANKLIN BAER, M.D.

By George W. Kosmak, M.D.
New York

January 27, 1846—September 11, 1920

BORN in Cumberland County, Pennsylvania, Dr. Baer was graduated from the Medical School of the University of Pennsylvania in 1876 and appointed an Instructor in Gynecology in his Alma Mater in 1878, which position he held till 1885, when he resigned to accept the Professorship of Gynecology in the Philadelphia Polyclinic Hospital and College. He remained in active association with this institution until two years before his death.

Dr. Baer was a member of many medical societies and at one time held the office of president of the Philadelphia Obstetrical Society. The deceased occupied a prominent rôle in the development of American gynecology, a field which he entered during its formative period. He was a bold and brilliant operator and among his more eminent contributions to the specialty is the development of a method for the surgical treatment of uterine fibroid tumors. For their removal he devised a particular technic of supravaginal hysterectomy which was later widely employed. The titles of his most important literary contributions deal with lacerations of the cervix, the significance of metrorrhagia at the time of the menopause, and a plea for early diagnosis of the pelvic diseases of women.

Digitized by Google

IN MEMORIAM

JOHN CHARLES REEVE, M.D., LL.D.

By Le Roy Broun, M.D.
New York City

A FOUNDER of the American Gynecological Society; a Vice-President; a member of its Council; an Honorary Fellow; President Emeritus of the Ohio State Medical Society; Organizer and for thirty years Chief of Staff of Saint Elizabeth's Hospital of Dayton, Ohio, and an Honorary Fellow of the College of Physicians of Philadelphia, Dr. Reeve was born at Wells Park, Somersetshire, England, on June 5, 1826.

He was the son of John Reeve and Sarah Gladwyn of Dorsetshire. He died September 15, 1920, of pneumonia, in his ninety-fifth year, at his home in Dayton, Ohio.

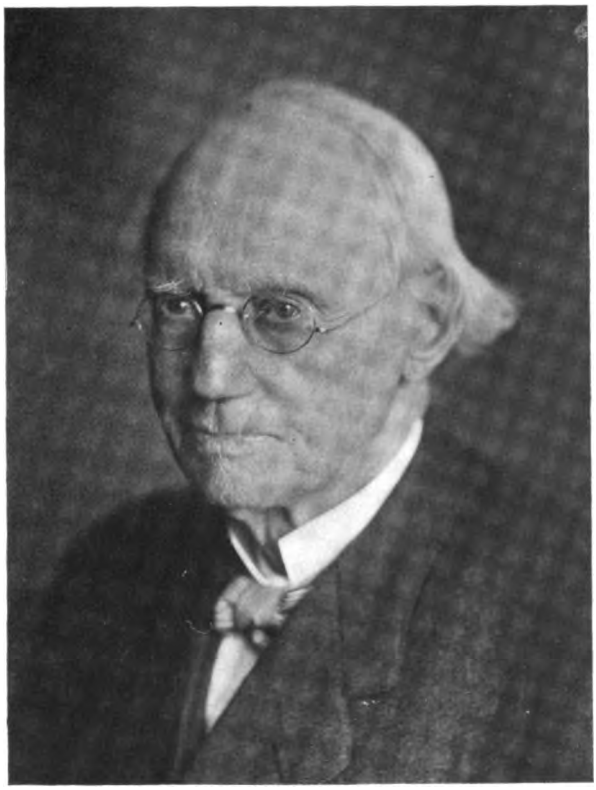
Dr. Reeve was revered and loved not only by the profession of Dayton, but by the entire city, so intimately was his personality interwoven with its growth and so freely had he given of his services for a life time to those in need without thought of self.

An editorial in one of the large dailies of his home on his retirement from active practice in 1908 says: . . . "He has seen Dayton grow from a village to a great city; he has served long, that is much; but he has served faithfully, that is more; he has served efficiently, that is the most any man can do; on his retirement he has the love and respect of all the people of the city." What an example! and in this present day of striving after emoluments and professional prestige,—what a life to pattern after! Truly Dr. Reeve was a physician. He lived in the hearts of all.

When his father became involved in the financial panic of 1838 during the time of Andrew Jackson, it became necessary that he should give up his school instruction at twelve years and seek employment. He was apprenticed on the "Cleveland Advertiser," a weekly paper, for two years. Completing his term of service he worked on the "Daily Herald." During this time his wish for an education was ever a fixed purpose, and towards that end he saved his wages that he might go to the academy at Kirtland.

His brother-in-law becoming postmaster in Cleveland, gave him a

Digitized by Google



CAT.

Digitized by Google

Digitized by Google

clerk's position and at the same time he studied German. His lessons were given by a shoemaker for whom he carried wood as a return.

Deciding to study medicine, he entered the office of Dr. John Delamater, a physician and teacher of prominence. Among his classmates were Procter Thayer and Henry Kirke Cushing,—the father of the present Dr. Cushing. Entering the Cleveland Medical College, now the medical department of the Western Reserve University in 1847, he did not complete the second year, having met and married Emma Barlow a teacher. They went out to the Lake Shore of Wisconsin in Dodge County, which was at that time attracting the attention of those of pioneer spirit. Here he practiced among the settlers of this district for three years. His life was that of a pioneer with all of its hardships and its improvisings in emergencies. He tells of having amputated a crushed leg with only a scalpel and a carpenter's saw, and of his lying awake on a hard dirt floor all of the following night in fear of hemorrhage.

Through the influence of a friend who intended to take a course in the University of Göttingen, he gave up the intention of going to the University of Pennsylvania and joined his friend in taking passage on a German sailing vessel, but he left the vessel at Dover and made his way to London, where he worked in the hospitals and clinics. Here he had abundant clinical material study and opportunity for surgery on the cadaver. While in London his interest in anesthesia was stimulated by the fact that Queen Victoria, at the time of her confinement, had permitted its use on herself a year previous. He took a few lessons from John Snow, the one who gave the chloroform to Queen Victoria at the time of her confinement.

Deaths from chloroform beginning to be reported, he collected 60 cases and made these the subject of a paper published in the *American Journal of Medical Sciences.* He noted that the majority of deaths occurred on the fresh addition of chloroform and warmly advocated the suggestion of Brown-Séquard in giving morphine and atropine prior to the anesthesia as a protective. He also became a warm advocate of the A. C. E. mixture to lessen the dangers of chloroform. His interest in anesthesia was maintained especially as it related to obstetrics and gave rise to many papers on the subject, chief of which was the chapter on anesthesia in Hirst's *American System of Obstetrics* (1888), also the chapter on chloroform in the American Edition of Holmes' Surgery.

Reeve then went to Göttingen for clinical instruction. Here he remained during the Summer of 1854 doing special work in obstetrics under von Siebold. To get back to America he obtained a place of surgeon on a sailing vessel and reached Cleveland with ten cents in his pocket; on arriving he was told that in a fire a short time previously all of his earthly goods had been destroyed.

Digitized by Google

Shortly after his return he settled in Dayton. In 1859 he translated Flourens *History of the Discovery of the Circulation of the Blood.* In 1860 he was elected Professor of Materia Medica at the Medical College of Ohio, Cincinnati. This position he did not fill, going to the front under Dr. Blackman, of Cincinnati, in the Civil War. After the close of the war he returned to Dayton to practice.

Dr. Reeve's great hold on the medical profession was due to his lovable personality and his high professional ideals associated with his keeping closely abreast with the advancements of over half a century, covering the birth of anesthesia, the advent of the clinical thermometer, the development of antisepsis and asepsis in surgery, and the microscope with its associated pathology.

The great respect and esteem entertained for him by the profession of his state is exemplified in the office of "President Emeritus" being voted by the Ohio State Medical Society, and the conferring of this signal honor upon him,—a tribute which has no counterpart as far as the writer of this memorial is aware.

His professional confrères in Dayton repeatedly tendered him congratulatory banquets in celebration of his continued activities. At one of these, on his ninetieth birthday, C. A. L. Reed of Cincinnati, in speaking of the guest of the evening said he was the typification of a crowning triumph and in amplifying, stated, "In youth he triumphed over adversity, in early manhood he triumphed over an environment that made for crudeness, rather than culture. In his professional life he triumphed over a conservatism that is content with the error of today, rather than the truth of tomorrow. In citizenship he triumphed over established convention always the impediment of progress. In human realization over selfishness, the enemy of brotherhood among men."

Dr. Reeve was one of the original members of the "Saturday Club of Dayton," a small body of men of literary taste and standing. Among papers contributed by Dr. Reeve was one on the life of Henry Bouquet, a notable Swiss figure in the west and an Indian fighter. This paper written at the age of ninety-one was contributed to the *Ohio State Historical and Antiquarian Quarterly;* it was a monument to the mental acumen of one of his years. Among other papers were the *"Cross and Crucification," "The Birth of a King," "Phallic Worship"* and *"Maeterlink's Mona Vanna."* When ninety-three years old, he contributed a series of four articles entitled *"Excursions in my Library"* to the *Medical Pickwick.*

So remarkable was the maintenance of his mental powers up to the time of his death, that on the request of Professor Wilder of Cornell, his brain was willed to the University.

Digitized by Google

His great heart with its love for all about him was emphasized by this quotation found in a notebook he always kept with him:

> "Who seeks for Heaven, alone to save his soul,
> May keep the path but will not reach the goal;
> While he who walks in love, may wander far,
> Yet God will bring him where the blessed are."

Sims, Fordyce, Barker, Battey and Chadwick, all gone before, were his devoted friends. He outlived them all and maintained in the living the active and fertile brain of one of half of his years.

Digitized by Google

IN MEMORIAM

MATTHEW DERBYSHIRE MANN, A.B., A.M., M.D., F.A.C.S.

By James E. King, M.D.
Buffalo, N. Y.

MATTHEW DERBYSHIRE MANN was born July 12, 1845, at Utica, N. Y. He obtained his early education in the Utica public schools, finishing with two years of European study under private tutelage before entering Yale. In 1867 he graduated from Yale with the degree of A.B. He then entered upon the study of medicine in Columbia University and received his degree from that institution in 1871. This same year Yale conferred upon him the degree of Master of Arts. After study abroad he began the practice of medicine in New York City in 1873 and for the five years following was a lecturer in the medical school of Columbia University. In 1879 he went to Hartford, Conn., and for one year was a lecturer in the Medical Department of Yale. In 1882 he was called to Buffalo to fill the chair of Obstetrics and Gynecology in the university, a position he held until 1910 when he was retired at the age limit.

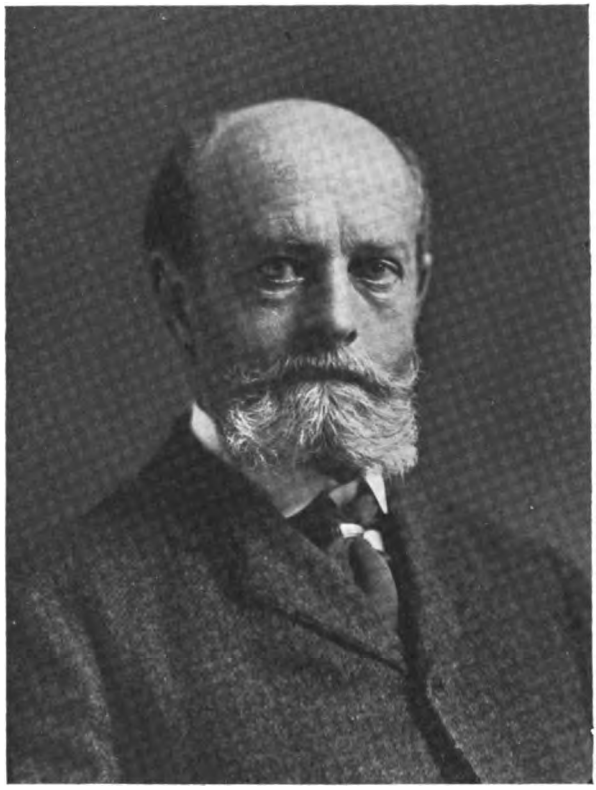
Dr. Mann was elected to membership in the American Gynecological Society in 1882; was its president in 1895 and in 1909 was made an honorary Fellow. As one of the founders of the American College of Surgeons he was much interested in the work of that organization. In 1901 he was vice-president of the International Society of Obstetrics and Gynecology, meeting in Rome, Italy. He was an active member of many local medical organizations.

Dr. Mann's literary work included a book on *Prescription Writing* published in 1879 and the two volumes of *The American System of Gynecology*, which he edited. He also contributed to journal literature over one hundred papers and addresses.

As a surgeon Dr. Mann was skillful and resourceful. When he came to Buffalo, operative gynecology was in its early development and his splendid training under the greatest teachers of that time placed him at once at the head of the profession in Western New York. His method for intraperitoneal shortening of the round ligaments is still employed and is known as the Mann operation. In 1901 he came into international prominence as the surgeon who operated upon President McKinley, when he was assassinated.

Dr. Mann's recreation was found in the field and forest. He was a

Digitized by Google



Matthew S. Quay

CAT.

Digitized by Google

Digitized by Google

true sportsman in the best sense of the word and deplored all unsportsmanlike methods. His hobby was civic beauty and he did much to interest others in maintaining and enhancing the beauty of his home city. He was also a great lover of flowers and at his country home he took much pride and spent much time in his garden which contained many and varied specimens.

Dr. Mann died March 2, 1921, at the age of seventy-six, several years after his retirement from active work. His death came suddenly. After returning home from his usual walk, he lay down for his accustomed afternoon rest and sleep: he never awakened. He is survived by his wife, Elizabeth Pope Mann, one daughter, and five sons, one of whom is a surgeon in San Diego, California.

Dr. Mann was firm in his convictions of right and would never compromise with what he considered to be his duty. As a teacher he was clear and forceful and always had the respect and love of his students. Those who knew him intimately best knew his sterling qualities and found inspiration for better effort in their work. His death marked the passing of one who has left his impress upon, and has exerted an influence in, the development of gynecology as a specialty.

Digitized by Google

IN MEMORIAM

JOSEPH TABER JOHNSON, A.M., PH.D., M.D., LL.D., F.A.C.S.

By J. Wesley Boveé, M.D.

Washington, D. C.

THE passing of a notable physician and man occurred March 12, 1921, in the death of Dr. Joseph Taber Johnson, at his home in Cherrydale, Va., in the seventy-sixth year of his life.

A descendant of John Alden and Priscilla Mullens, of the "Mayflower" and grandson of Jeremiah Johnson, a soldier of the Revolutionary War, he was born of Lorenzo Dow and Mary (Burgess) Johnson, June 30, 1845, at Lowell, Massachusetts.

His early education was secured at Rochester Academy, Plymonth County, Massachusetts, 1855-9, and Columbia College (now George Washington University), Washington, D. C., 1860-2.

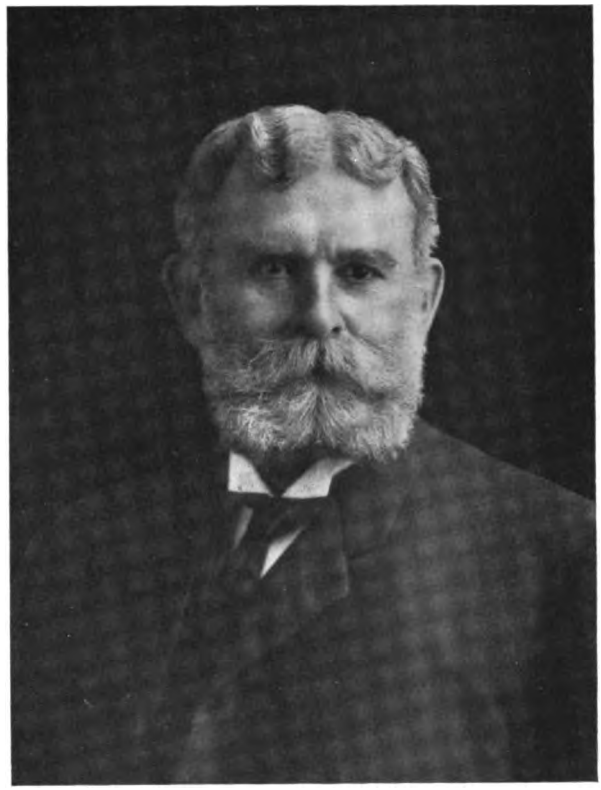
His degree in medicine was obtained in 1865 from the Medical Department of Georgetown University and from Bellevue in 1868. His A.M. degree was conferred by Columbia College in 1869.

After studying obstetrics in Paris and Vienna he received in the latter city, in 1871, a diploma in obstetrics. The Ph.D. degree was received from Georgetown University, in 1890, and at the 125th anniversary of that great University he was honored with the conferring of the degree of Doctor of Laws, in 1914.

His practical professional work began as an acting assistant surgeon in the United States Army. He was connected with Freedmen's Hospital, an institution that came into existence at the close of the Civil War, from 1868 to 1873 and coincidently was Professor of Obstetrics and Gynecology in Howard University. This school was also the outcome of the emancipation of slavery and was created for the purpose of educating the negro race, as was the Freedmen's Hospital for caring for the sick of that race, the two institutions being located adjacently and managed in complement. He was Lecturer on Obstetrics in Georgetown University, 1874-6; Professor of Obstetrics and Gynecology 1876-1887; Professor of Gynecology and Abdominal Surgery 1887-1912, thus serving as a teacher in that school of medicine thirty-eight successive years.

He rendered additional service to it by being president of the faculty (1883-1897) and its vice-president from 1897 to 1912 and as president

Digitized by Google



Jas Zeke Johnson

CAT.

Digitized by Google

Digitized by Google

of the Medical Board and Chief Gynecologist of the Georgetown University Hospital for several years.

For many years he was gynecologist to Providence Hospital and twice served as gynecological surgeon to Columbia Hospital for Women.

He was consulting gynecologist to Emergency Hospital and from 1887 to 1912 conducted his private hospital for women.

It is stated he performed more than three thousand abdominal operations and the first ovariotomy in the District of Columbia, and retired from active pursuit of his profession in July, 1915—fifty years after his graduation in medicine.

His membership in medical organizations was large. He was a member of the Medical Society of the District of Columbia; a founder of the Washington Obstetrical and Gynecological Society, and its president in 1887-9; a Fellow of the Southern Surgical and Gynecological Association and its president in 1889; Fellow of the American Medical Association and chairman of its obstetric section one year; member of the Massachusetts Medical Society and of the Medical Society of Virginia; of the Washington Philosophical and Anthropological Societies and Honorary Fellow of the British Gynecological Society.

His connection with the American Gynecological Society was distinctive; he was one of its founders and with James R. Chadwick and Paul F. Mundé was largely instrumental in its creation and in planning the foundation upon which it has grown to great achievement. He was its secretary 1886-1890; vice-president in 1891, and president in 1899. He served on its council 1881-5 and 1897 and was an Hononary Fellow from 1915 to the date of his death.

As a contributor to the science and literature of medicine he was well known. More than eighty papers were contributed by him and his contribution of *Surgical Diseases of Fallopian Tubes and Ovaries* to Dennis' *System of Surgery* was a feature of that work. Nine of his papers appear in the transactions of this Society.

His early writing was largely upon obstetric subjects but, as his practice extended more into gynecology and abdominal surgery, his writing on the various phases of those branches of medicine predominated.

His skill as a diagnostician and surgeon was well known and particularly was this realized in his home city.

I have already referred to his long period of teaching. In presenting him the honorary degree of LL.D., Father Creeden manifested the estimate put upon that work by his official superiors in these words:

"Georgetown honors herself today in honoring that most noted alumnus of her School of Medicine, Joseph Taber Johnson, whose persevering and unremitting work of teaching has endeared him to his Alma Mater, whose skillful surgery has indebted to him so many suf-

Digitized by Google

ferers of womankind, whose words and writings have merited so much from his disciples and from the whole medical profession."

He was a systematic thinker, a ready debater and ably discussed scientific papers.

While in his earlier work he was skeptical of the serious influence of gonorrhea on the health and fecundity of women. He later became thoroughly convinced of it and most of his papers during the last ten years of his writing were on this timely topic.

One cannot but reflect upon the tremendous benefit to mankind that must come of fifty years of active work of hand and head, as were Johnson's in such lofty endeavor, precept, and accomplishment. Such work requires the inherent, indomitable spirit that never meets defeat, but merely changes the plan of action if met by obstinate resistance to progress. The life and work of such a man is distributed among untold future generations as well as his own. Such a life may well scoff at pessimists and laggards.

Though at the age of seventy years he retired from the activities of medicine, it is more than probable that relinquishment was due to a bad state of health and not to a lack of interest and ambition.

Of such a man one feels a working life of twice what his was would be invaluable to the human race.

Were his health and age favorable, I can well imagine he would have been deeply engaged in the propaganda against venereal diseases that was so vigorously conducted during the great World War.

He has left a heritage to his former students that they will do well to recognize and be honored in so doing.

He outlived both of his wives and was survived by four adult children, one of whom is Dr. L. B. T. Johnson, of Washington, D. C.

This Society was organized but forty-five years ago and I believe Dr. Johnson's passing to the great beyond also marks the passing of the last but one of its founders.

Digitized by Google

Digitized by Google

CAT.

Rachel McE. Emmert

Digitized by Google

IN MEMORIAM

BACHE McEVERS EMMET, M.D.

By Henry C. Coe, M.D.
New York

BACHE McEVERS EMMET was born at Hyde Park, N. Y., on May 23, 1843, and died at his home, Ridgefield, Conn., May 27, 1921, four days before his seventy-eighth birthday. His early education was obtained in Geneva, Switzerland. Later he studied medicine and attended the hospitals in Paris, where his father resided for several years. He naturally became a proficient French scholar. Returning to America after the close of the Civil War, Dr. Emmet graduated from the College of Physicians and Surgeons in New York in 1867. He served as interne in the Woman's Hospital with our esteemed Fellow, Dr. George Harrison, in 1870-71, where he was much liked by the patients on account of his unfailing tact and gentle consideration. With Dr. Harrison he was later appointed Assistant Surgeon to Dr. T. A. Emmet, whom he served loyally until the latter's retirement, when he became Attending Surgeon and remained in that position until 1913, when he was appointed Consulting Surgeon. He was for many years Professor of Gynecology at the New York Post Graduate Medical School and Gynecologist to the Hospital, resigning these positions in 1913 when he retired from practice.

Dr. Emmet was elected Fellow of the American Gynecological Society in 1887, Vice President in 1894, and Honorary Fellow in 1912. He was also a Fellow of the British Gynecological Society. His membership in local societies included the New York Academy of Medicine, New York Obstetrical, New York State Medical and County Societies.

After his retirement he spent his winters in California and the South and his summers at his home in Ridgefield, where he entered into his final rest after a painful and lingering illness of nearly three years, through which he was cheered and sustained by a devoted wife.

Dr. Emmet's life was so quiet and unobtrusive, overshadowed as he was by the prominence of his famous relative, that he neither desired nor attained any greater reward than the esteem and respect of his confreres, which he enjoyed in full measure. His friends were many; of enemies he had none. His personality was singularly attractive. Always modest and unassuming, dignified and high-bred, he had a gentle, kindly face which won confidence and affection alike from rich and

Digitized by Google

poor. His attitude towards women, high and low, was that of a gentleman. Conservative in his profession and practice, a loyal follower of his great chief, he was faithful to the traditions of the institution which he served so long and so well. It was granted to few to know him intimately and the writer counts it a great privilege to have enjoyed his friendship and appreciated the beauty and purity of his character for forty years. We use too lightly the good old term "gentleman"—one who does gentle deeds. It has a deeper significance than the halo conferred by heritage or social position. As we recall the daily life of our lost friend, his invariable courtesy, his pure and kindly heart, and his patient endurance until the end, we can pay no higher tribute to him than to call him the finest type of a Christian gentleman.

"Nothing in his life
Became him like the leaving it."

We laud the heroes of the war. I have looked into the fearless eyes of many a brave youth, as they closed in the hour of victory, but no nobler or more gallant spirit have I known than he who, calmly and unafraid, faced the last enemy, *Erat homo.*

DR. EMMET'S CONTRIBUTIONS TO MEDICAL LITERATURE

Intrauterine Medication. Trans. Alumni Assoc. Woman's Hospital, ii. Retroperitoneal Cysts of the Female Sexual Organs; a study of their treatment, Am. Jour. Obst., 1890, xxiii. Case of Extrauterine Fetation, New York Med. Jour., Jan., 1882. Lacerations of the Cervix and Perineum, Mann's System of Gynecology, 1887. Management of Contagious Eruptive Diseases, Buck's Hygiene and Public Health, 1879. Amputation of the Cervix, New York Obst. Soc., May, 1887. Paper on Laceration of the Cervix, Trans. Am. Gynec. Soc. Galvanism in Gynecology, Post. Grad. Med. Jour. Outline of Uterine Therapeutics, Especially Massage and Electricity, Keating and Coe's System of Gynecology. Removal of the Uterus in Disease of the Adnexa, Trans. Am. Gynec. Soc., 1894. Injury to the Ureter in Abdominal Surgery, Am. Jour. Obst., 1895. Multiple Myomata in the Abdominal Cavity; a Study of the Genesis of Fibroids, Am. Jour. Obst., July, 1897. Cure of Procidentia Uteri, Post. Grad. Med. Jour., March, 1901.

Instruments Devised by Emmet: Steel Button for Vesico-vaginal Fistula, Perineal Wire Scissors, Trocar for Pelvic Abscess, Broad Ligament Clamps for Vaginal Hysterectomy, Uterine Forceps for Laparotomy, Various Retractors.

Digitized by Google

INDEX

A

Abdominal abortion, 362
ADAIR, FRED L., external pelvic measurements of French and American women, 55
discussing fads and fancies of obstetrics; forced labor; and drudgery of obstetrics, 44
Adnexal disease, radical conservatism in the surgical treatment of chronic, 276
American gynecology, 1
Amputation of the cervix and trachelorrhaphy, end results of, 340
ANSPACH, BROOKE M., drudgery of obstetrics, 32
discussing interpretation of vesical symptoms in gynecologic diagnosis, 96
torsion of uterine adnexa, 312
AUB, J. C., discussing basal metabolism in pregnancy and the puerperium, 53

B

Bacteriology and pathology of fallopian tubes removed at operation, 242
BAER, BENJAMIN FRANKLIN, in memoriam, 379
BAER, JOSEPH L., basal metabolism in pregnancy and the puerperium, 46, 54
discussing pneumoperitoneum and roentgenology, 140
perforating hemorrhagic cysts of the ovary, 239
BAGG, HALSEY J., AND BAILEY, HAROLD, vulval and vaginal cancer treated by filtered and unfiltered radium emanation, 319
BAILEY, HAROLD C., discussing fads and fancies of obstetrics; forcer labor; and drudgery of obstetrics, 44
— AND BAGG, HALSEY J., vulval and vaginal cancer treated by filtered and unfiltered radium emanation, 319, 330
Basal metabolism in pregnancy and the puerperium, 46
BELL, W. BLAIR, unsolved problems in gynecology and obstetrics, 142, 152
discussing development of the hymen, 160
dietary factors in the causation of sterility in rats, 114
ovulation and menstruation; chronic adnexal disease; and disposition of uterus following salpingectomy, 291, 293
BOVÈE, J. WESLEY, discussing fads and fancies of obstetrics; forced labor; and drudgery of obstetrics, 42
vaginal supracervical hysterectomy, 90
BRETTAUER, JOSEPH, discussing ovulation and menstruation; chronic adnexal disease; and disposition of uterus following salpingectomy, 295
unsolved problems in gynecology and obstetrics, 151
BUTLER, WILLIAM J., AND SMITH, RICHARD R., torsion of the uterine adnexa occurring before puberty, 298
BYFORD, HENRY T., cure of cystic cervical endometritis by the aid of multiple scarification, 331, 360
discussing interpretation of vesical symptoms in gynecologic diagnosis, 98

C

Cecum, torsion of, 315
CHALFANT, SIDNEY A., torsion of cecum, 315
CHIPMAN, WALTER WILLIAM, American gynecology, 1
discussing perforating hemorrhagic cysts of the ovary, 239, 241
CULBERTSON, CAREY, disposition of the uterus following salpingectomy when it is desirable to preserve menstruation, 280
discussing hemorrhage from nonpregnant uterus, 269
ovulation and menstruation; chronic adnexal disease; and disposition of uterus following salpingectomy, 296
perforating hemorrhagic cysts of the ovary, 239

Digitized by Google

CURTIS, ARTHUR H., bacteriology and pathology of fallopian tubes removed at operation, 242
discussing cystic cervical endometritis; endocervicitis and eversion; and amputation of the cervix and trachelorrhaphy, 359
interpretation of vesical symptoms in gynecologic diagnosis, 97
ovulation and menstruation; chronic adnexal disease; and disposition of uterus following salpingectomy, 292, 295
Cystic cervical endometritis, cure of, by multiple scarification, 331

D

DAVIS, CARL HENRY, discussing fads and fancies of obstetrics; forced labor; and drudgery of obstetrics, 43
DAVIS EDWARD P., discussing basal metabolism in pregnancy and puerperium, 53
dietary factors in the causation of sterility in rats, 115
external pelvic measurements of French and American women, 77
fads and fancies of obstetrics; forced labor; and drudgery of obstetrics, 40
unsolved problems in gynecology and obstetrics, 151
DELEE, JOSEPH B., discussing fads and fancies of obstetrics; forced labor; and drudgery of obstetrics, 35
Development of the hymen, 153
DICKINSON, ROBERT L., endocervicitis and the nasal cautery tip, 334, 360
discussing fads and fancies of obstetrics; forced labor; and drudgery of obstetrics, 42
interpretation of vesical symptoms in gynecologic diagnosis, 97
pneumoperitoneum and roentgenology, 139
vaginal supracervical hysterectomy, 90
Dietary factors in the causation of sterility in rats, 99
Drudgery of obstetrics, 32

E

EHRENFEST, HUGO, discussing external pelvic measurements of French and American women, 77
fads and fancies of obstetrics; forced labor; and drudgery of obstetrics, 43
torsion of uterine adnexa, 312
EMMET, BACHE MCEVERS, in memoriam, 397
Endocarditis, acute malignant, complicating pregnancy, 79
Endocervicitis and eversion and the nasal cautery tip, 334
Endometritis, cystic cervical, cure of, by multiple scarification, 331

F

Fads and fancies of obstetrics, 12
Fallopian tubes removed at operation, bacteriology and pathology of, 242
FINDLEY, PALMER, acute malignant endocarditis complicating pregnancy, 79
Forced labor, its status in obstetric teaching, 24
FOULKROD, COLLIN, discussing basal metabolism in pregnancy and the puerperium, 53

G

GOFFE, J. RIDDLE, discussing vaginal supracervical hysterectomy, 90
GRAVES, WILLIAM P., discussing ovulation and menstruation; chronic adnexal disease; and disposition of uterus following salpingectomy, 289
Gynecologic diagnosis, vesical symptoms in, 92
Gynecology and obstetrics, unsolved problems in, 142

H

HAAG, discussing pneumoperitoneum and roentgenology, 140, 141
HARRIS, PHILANDER A., discussing fads and fancies of obstetrics; forced labor; and drudgery of obstetrics, 39
HART, DAVID BERRY, in memoriam, 368
HEAVEY, N. SPROAT, discussing fads and fancies of obstetrics; forced labor; and drudgery of obstetrics, 43
perforating hemorrhagic cysts of the ovary, 237
Hemorrhage from the nonpregnant uterus in the absence of a neoplasm, 259

Digitized by Google

HOLDEN, FREDERICK C., radical conservatism in the surgical treatment of chronic adnexal disease, 276
discussing ovulation and menstruation; chronic adnexal disease; and disposition of uterus following salpingectomy, 296
HOLMES, RUDOLPH W., fads and fancies of obstetrics, 12
discussing external pelvic measurements of French and American women, 78
fads and fancies of obstetrics; forced labor; and drudgery of obstetrics, 44
HUTCHINS, HENRY T., perforating hemorrhagic cysts of the ovary, 238
Hymen, development of the, 153

J

JOHNSON, JOSEPH TABER, in memoriam, 390

K

KEENE, FLOYD E., interpretation of vesical symptoms in gynecologic diagnosis, 92, 98
discussing torsion of uterine adnexa, 313
vulval and vaginal cancer treated by radium emanation, 329
KOSMAK, GEORGE W., discussing fads and fancies of obstetrics; forced labor; and drudgery of obstetrics, 41

Mc

MCGLINN, JOHN A., discussing fads and fancies of obstetrics; forced labor; and drudgery of obstetrics, 42
vaginal supracervical hysterectomy, 90

M

MACOMBER, DONALD, AND REYNOLDS, EDWARD, dietary factors in the causation of sterility in rats, 99, 115
MANN, MATTHEW DERBYSHIRE, in memoriam, 386
Menstruation and ovulation as postoperative considerations, 271
MILLER, G. BROWN, discussing perforating hemorrhagic cysts of the ovary, 238
vaginal supracervical hysterectomy, 88

N

NEWELL, FRANKLIN S., abdominal abortion, 362
discussing fads and fancies of obstetrics; forced labor; and drudgery of obstetrics, 41
NORRIS, CHARLES C., discussing ovulation and menstruation; chronic adnexal disease and disposition of uterus following salpingectomy, 293
torsion of uterine adnexa, 313

O

Obstetric teaching, status of forced labor in, 24
Obstetrics, fads and fancies of, 12
Ovary, perforating hemorrhagic (chocolate) cysts of the, 162
Ovulation and menstruation as postoperative considerations, 271

P

Pelvic measurements, external, of French and American women, 55
Perforating, hemorrhagic (chocolate) cysts of the ovary, 162
PETERSON, REUBEN, pneumoperitoneum and roentgenology as aids to more accurate obstetrics and gynecologic diagnosis, 116
Pneumoperitoneum and roentgenology as aids to more accurate obstetrics and gynecologic diagnosis, 116
POLAK, JOHN O., forced labor, its status in obstetric teaching, 24
discussing fads and fancies of obstetrics; forced labor; and drudgery of obstetrics, 45
interpretation of vesical symptoms in gynecologic diagnosis, 96
ovulation and menstruation; chronic adnexal disease; and disposition of uterus following salpingectomy, 294

Digitized by Google

POMEROY, RALPH, discussing fads and fancies of obstetrics; forced labor; and drudgery of obstetrics, 38
perforating hemorrhagic cysts of the ovary, 238
POTTER, IRVING W., discussing fads and fancies of obstetrics; forced labor; and drudgery of obstetrics, 35
Pregnancy and the puerperium, basal metabolism in, 46

R

Radical conservatism in the surgical treatment of chronic adnexal disease, 276
Radium emanation, vulval and vaginal cancer treated by filtered and unfiltered, 319
RAWLS, REGINAL M., amputation of the cervix and trachelorrhaphy, 340-360
REEVE, JOHN CHARLES, in memoriam, 380
REYNOLDS, EDWARD, discussing pneumoperitoneum and roentgenology, 138
— AND MACOMBER, DONALD, dietary factors in the causation of sterility in rats, 99, 114
RICHARDSON, EDWARD H., discussing interpretation of vesical symptoms in gynecologic diagnosis, 97
ovulation and menstruation; chronic adnexal disease; and disposition of uterus following salpingectomy, 290
perforating hemorrhagic cysts of the ovary, 237
pneumoperitoneum and roentgenology, 140, 141
Roentgenology and pneumoperitoneum, as aids to more accurate obstetrics and gynecologic diagnosis, 116
RUBIN, I. C., discussing pneumoperitoneum and roentgenology, 134

S

Salpingectomy, disposition of uterus following, 280
SAMPSON, JOHN A., perforating hemorrhagic (chocolate) cysts of the ovary, 162, 239, 241
discussing hemorrhage from nonpregnant uterus, 269
SCHENCK, BENJAMIN ROBINSON, in memoriam, 372
SCHUMANN, EDWARD A., discussing torsion of the cecum, 317
unsolved problems in gynecology and obstetrics, 150
SCOTT, WILLIAM A., hemorrhage from the nonpregnant uterus in the absence of a neoplasm, 259, 270
SMITH, RICHARD R., discussing perforating hemorrhagic cysts of the ovary, 236
torsion of uterine adnexa, 312
— AND BUTLER, WILLIAM J., torsion of the uterine adnexa occurring before puberty, 298
Sterility in rats, dietary factors in causation of, 99
STONE, WILLIAM S., discussing fads and fancies of obstetrics; forced labor; and drudgery of obstetrics, 40
hemorrhage from nonpregnant uterus, 269
STUDDIFORD, WILLIAM E., discussing unsolved problems in gynecology and obstetrics, 150

T

TAUSSIG, FRED J., development of the hymen, 153, 161
discussing vulval and vaginal cancer treated by radium emanation, 328
Torsion of the cecum, 315
of the uterine adnexa occurring before puberty, 298
Trachelorrhaphy and amputation of the cervix, end results of, 340

U

Unsolved problems in gynecology and obstetrics, 142
Uterine adnexa, torsion of, occurring before puberty, 298
Uterus, disposition of, following salpingectomy where it is desirable to preserve menstruation, 280

V

Vaginal and vulval cancer treated by filtered and unfiltered radium emanation, 319
supracervical hysterectomy with interposition of the cervical stump for cystocele and procidentia associated with enlargement of the uterus, 81
Vesical symptoms in gynecologic diagnosis, interpretation of, 92

Digitized by Google

VINEBERG, HIRAM N., vaginal supracervical hysterectomy with interposition of the cervical stump for cystocele and procidentia associated with enlargement of the uterus, 81, 91
discussing torsion of uterine adnexa, 313
Vulval and vaginal cancer treated by filtered and unfiltered radium emanation, 319

W

WARD, GEORGE GRAY, JR., discussing interpretation of vesical symptoms in gynecologic diagnosis, 98
pneumoperitoneum and roentgenology, 136
vaginal supracervical hysterectomy, 88
vulval and vaginal cancer treated by radium emanation, 329
WATKINS, THOMAS J., ovulation and menstruation as postoperative consideration, 271
discussing cystic cervical endometritis; endocervicitis and eversion; and amputation of the cervix and trachelorrhaphy, 359
ovulation and menstruation; chronic adnexal disease; and disposition of uterus following salpingectomy, 296
vaginal supracervical hysterectomy, 81

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google